STIC Search Report

9D28

EIC 2600

USPTO

Scientific & Technical Information Center

STIC Database Tracking Number: 154834

TO: Lucas Divine
Location: Knox 9D28
Art Unit: 2624
Tuesday, May 31, 2005

Case Serial Number: 09/822884

From: Pamela Reynolds
Location: EIC 2600
KNOX 8B54
Phone: 571-272-3505

Pamela.Reynolds@uspto.gov

Search Notes

Dear Lucas Divine,

Please find attached the search results for 09822884 for data on Lucent and Compact Service Node. I searched the standard Dialog files, (NOT THE PATENT FILES), and the internet.

If you would like a re-focus please let me know.

Thank you.

sira
Search and Information Resources Administration

frst + Found 154834 a9

Access DB# 154834

SEARCH REQUEST FORM

Scientific and Technical Information Center

99

Requester's Full Name Lucas Divine Examiner #: 80399 Date: 5/24/05
Art Unit: 2624 Phone Number 2-7434 Serial Number: 09/822884
Location: Knox 9D28 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elec species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define an terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertir claims, and abstract.

Title of Invention: __________

Inventors (please provide full names): __________

Earliest Priority Filing Date: __________

**For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

Intelligent Network Service Node

Compact Service Node platform by Lucent Technologies

Bell South Intellectual Property Corp. assignee

STAFF USE ONLY

Searcher:	Reynolds	**Type of Search**		**Vendors and cost where applicable**	
Searcher Phone #:	8:571-272-3505	Sequence (#)		STN	
Searcher Location:		AA Sequence (#)		Dialog	✓
Date Searcher Picked Up:	5-30-05 10:00	Structure (#)		Questel/Orbit	
Date Completed:	5-31-05 1140	Bibliographic		Dr.Link	
Searcher Prep & Review Time:		Litigation		Lexis/Nexis	
Clerical Prep Time:		Fulltext		Sequence Systems	✓
Online Time:		Patent Family		WWW/Internet	✓
		Other		Other (specify)	

File 2:INSPEC 1969-2005/May W4
(c) 2005 Institution of Electrical Engineers
File 6:NTIS 1964-2005/May W4
(c) 2005 NTIS, Intl Cpyrght All Rights Res
File 8:Ei Compendex(R) 1970-2005/May W3
(c) 2005 Elsevier Eng. Info. Inc.
File 34:SciSearch(R) Cited Ref Sci 1990-2005/May W4
(c) 2005 Inst for Sci Info
File 35:Dissertation Abs Online 1861-2005/May
(c) 2005 ProQuest Info&Learning
File 65:Inside Conferences 1993-2005/May W4
(c) 2005 BLDSC all rts. reserv.
File 94:JICST-EPlus 1985-2005/Apr W2
(c)2005 Japan Science and Tech Corp(JST)
File 95:TEME-Technology & Management 1989-2005/Apr W4
(c) 2005 FIZ TECHNIK
File 99:Wilson Appl. Sci & Tech Abs 1983-2005/Apr
(c) 2005 The HW Wilson Co.
File 144:Pascal 1973-2005/May W4
(c) 2005 INIST/CNRS
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
(c) 1998 Inst for Sci Info
File 583:Gale Group Globalbase(TM) 1986-2002/Dec 13
(c) 2002 The Gale Group
File 603:Newspaper Abstracts 1984-1988
(c)2001 ProQuest Info&Learning
File 483:Newspaper Abs Daily 1986-2005/May 26
(c) 2005 ProQuest Info&Learning

Set	Items	Description
S1	0	COMPACT()SERVICE()NODE??
S2	2074	CSN
S3	3	INTELLIGENT()NETWORK()SERVICE()NODE?
S4	8210	LUCENT
S5	1	(S1 OR S3) AND (PLATFORM?? OR ARCHITECTURE?)
S6	3	S3 OR S5
S7	3	RD S6 (unique items)
S8	0	S4 AND COMPACT AND NODE?
S9	69	S4 AND INTELLIGENT()NETWORK?
S10	0	S9 AND COMPACT
S11	1	S9 AND NODE?
S12	1	S11 NOT S6

7/3,K/1 (Item 1 from file: 2)
DIALOG(R)File 2:INSPEC

6151885 INSPEC Abstract Number: B1999-03-6210Q-003
Title: Intelligent networks move advanced services ahead
Author(s): Pilcher, R.
Journal: Telecommunications (International Edition) vol.32, no.11 p.63, 65-6, 68
Publisher: Horizon House Publications,
Publication Date: Nov. 1998 Country of Publication: USA
CODEN: TLCOAY ISSN: 0040-2494
SICI: 0040-2494(199811)32:11L.63:INMA;1-#
Material Identity Number: L873-1998-012
Language: English
Subfile: B
Copyright 1999, IEE

Abstract: With competitive differentiation foremost in many public network operators' minds, **intelligent network service nodes** seem to offer an answer. Some believe these nodes may prove to be a strategic...

7/3,K/2 (Item 1 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

04364962 E.I. No: EIP96033112863
Title: What do service providers really want?
Author: Johnson, Mona
Source: Telephony v 230 n 9 Feb 26 1996. 4pp
Publication Year: 1996
CODEN: TLPNAS ISSN: 0040-2656
Language: English

Abstract: The domestic market for **intelligent network service nodes** and intelligent peripherals is booming. However, this kind of market growth depends on **platform** vendor's abilities to meet service provider requirements. It is shown that service providers have...

...architectural/technical demands and short-term pragmatic ones. In the long-term, service providers envision **architectures** that will allow scalibility and high performance, plus integration with existing and future operations support...
Descriptors: *Intelligent networks; Computer **architecture** ; Telecommunication services; Telecommunication traffic; Cost effectiveness; Marketing; Competition; Standards; Voice/data communication systems; Object oriented...

7/3,K/3 (Item 1 from file: 583)
DIALOG(R)File 583:Gale Group Globalbase(TM)

06257359
ERICSSON SKRIVER AXE-KONTRAKT MED ESPRIT
UK: ESPRIT AWARDS ERICSSON AXE-CONTRACT
Press Release (DI) 23 Jan 1996 s. 1
Language: SWEDISH

... AXE equipment for local, transit and international applications, also capable of being used as IN (**Intelligent Network**) **service nodes .** This brings Esprit the advantage of being able to market IN services to its clients...
?

12/3,K/1 (Item 1 from file: 2)
DIALOG(R)File 2:INSPEC

7080898 INSPEC Abstract Number: B2001-12-6210Q-002
Title: Multi-vendor integrations of SCPs and SSPs
Author(s): Chang, Y.C.; Chen, J.B.; Wu, S.S.; Chu, C.L.; Lee, L.T.; Pai, H.J.; Hwang, P.K.; Sun, S.W.; Chang, W.T.; Hwang, J.W.; Lee, I.T.
Author Affiliation: Internet & Multimedia Lab., ChungHwa Telecom Co., Tao-Yuan, Taiwan
Conference Title: IEEE Intelligent Network 2001 Workshop. IN 2001 Conference Record (Cat. No.01TH8566) p.29-35
Publisher: IEEE, Piscataway, NJ, USA
Publication Date: 2001 Country of Publication: USA xi+372 pp.
ISBN: 0 7803 7047 3 Material Identity Number: XX-2001-00857
U.S. Copyright Clearance Center Code: 0 7803 7047 3/2001/$10.00
Conference Title: IEEE Intelligent Network 2001 Workshop. IN 2001 Conference Record
Conference Date: 6-9 May 2001 Conference Location: Boston, MA, USA
Language: English
Subfile: B

...Abstract: Taiwan, ROC and puts forth some suggestions for the goal of successful INAP interworking. The **intelligent network** of CHT long distance management (CHT-LDM) consists of **nodes** fabricated by three of the major telecommunication vendors in the world. The SSP vendors are Alcatel, **Lucent** , and Siemens while the SCP ones are Alcatel and Stratus. Alcatel SCP provide personal number...

... goals. The first step of IN service deployment is to define the specification of the **intelligent network** application protocol (INAP). The specification of CHT-LDM INAP is defined based on ETS 300...
...Descriptors: **intelligent networks** ;
...Identifiers: **Lucent** ; ...

... **intelligent network** application protocol
?

Multi-vendor integrations of SCPs and SSPs

Chang, Y.C. Chen, J.B. Wu, S.S. Chu, C.L. Lee, L.T. Pai, H.J. Hwang, P.K. Sun, S.W. (
Hwang, J.W. Lee, I.T.
Internet & Multimedia Lab., ChungHwa Telecom Co., Tao-Yuan;

This paper appears in: **Intelligent Network Workshop, 2001 IEEE**
Publication Date: 6-9 May 2001
On page(s): 29-35
Meeting Date: 05/06/2001 - 05/09/2001
Location: Boston, MA, USA
ISBN: 0-7803-7047-3
References Cited: 12
INSPEC Accession Number: 7080898
DOI: 10.1109/INW.2001.915291
Posted online: 2002-08-07 00:20:49.0

Abstract
This paper reports the experiences encountered in the multi-vendor integration processes of SSP ChungHwa Telecom (CHT), Taiwan, ROC and puts forth some suggestions for the goal of succes interworking. The intelligent network of CHT long distance management (CHT-LDM) consists of n fabricated by three of the major telecommunication vendors in the world. The SSP vendors are Al and Siemens while the SCP ones are Alcatel and Stratus. Alcatel SCP provide personal number (virtual private network (VPN) services, and Stratus SCP provide advanced freephone (A-080) ser developed by the IN Project of CHT Telecom Laboratories (CHT-TL). In the processes of PN, A-0 service deployment, multi-vendor integrations of IN services and their access platform in terms of the commonly recognized international standards are regarded as one of the major goals. The firs service deployment is to define the specification of the intelligent network application protocol (IN/ specification of CHT-LDM INAP is defined based on ETS 300 374-1. Based on the INAP specifica integration process is divided into three phases: conformance, service feature and interworking te three testing phases, problems are found, clarified, and solved after discussions and negotiations vendors. These problems can be classified into categories by their nature: (1) information elemen encoding and decoding error, (2) parameter decoding failure, (3) parameter value error, (4) paran value error, (5) functionality error, and (6) ACN negotiation error

Index Terms
Inspec
Controlled Indexing
conformance testing intelligent networks protocols telecommunication control telecommunication services telecommunication signalling telecommunication standard

Non-controlled Indexing
A-080 service ACN negotiation error Alcatel ChungHwa Telecom ETS 300 374-1 IN Project INAP interworking Lucent PN SCP SSP Siemens Stratus VPN access platform advanced freephone service conformance tests decoding error functionality error information element encoding error intelligent network application protocol international standards interworking tests long distance management multi-vendor integration parameter decoding failure parameter default value error parameter value error personal number service control points service feature tests virtual private netw
Author Keywords
Not Available

References

No references available on IEEE Xplore.

Multi-Vendor Integrations of SCPs and SSPs

Y. C. Chang, J. B. Chen, S. S. Wu, C. L. Chu, L. T. Lee, H. J. Pai, P. K. Hwang, S. W. Sun
Internet and Multimedia Laboratory,
Telecommunication Laboratories, ChungHwa Telecom. Co.,
Tao-Yuan, Taiwan 320, R.O.C.

W. T. Chang, J. W. Hwang, I. T. Lee
*Long Distance Management ChungHwa Telecom Co., Ltd.

Abstract- **This paper reports the experiences encountered in the multi-vendor integration processes of SSP and SCP at ChungHwa Telecom (CHT), Taiwan, ROC and puts forth some suggestions for the goal of successful INAP interworking. Intelligent Network of CHT Long Distance Management (CHT-LDM) consists of nodes fabricated by three of the major telecom vendors in the world. The SSP vendors are Alcatel, Lucent, and Siemens while the SCP ones are Alcatel and Stratus. Alcatel SCPs provide Personal Number (PN) and Virtual Private Network (VPN) services, and Stratus SCPs provide Advanced Free Phone (A-080) service developed by IN Project of CHT Telecom Labs(CHT-TL).**

In the processes of PN, A-080, and VPN service deployment, multi-vendor integrations of IN services and their access platform in terms of adherence to the commonly recognized international standards are regarded as one of the major goals. The first step of IN service deployment is to define the specification of Intelligent Network Application Protocol (INAP). The specification of CHT-LDM INAP is defined based on ETS 300 374-1 [3].

Based on the INAP specification [8], the integration process is divided into three phases: conformance, service feature and interworking tests. In all the three testing phases, problems are found, clarified, and solved after discussions and negotiations with the vendors. These problems can be classified into categories by their nature: (1) IE encoding and decoding error, (2) parameter decoding failure, (3) parameter value error, (4) parameter default value error, (5) functionality error, and (6) ACN negotiation error.

I. INTRODUCTION

For the purposes of ubiquitous availability of IN services and uniform distribution of IN call traffic, a uniform IN service access platform for PSTN network is required. However, Intelligent Network of CHT-LDM consists of nodes fabricated by three of the major telecom vendors in the world. The SSP vendors are Alcatel, Lucent, and Siemens while the SCP ones are Alcatel and Stratus. Alcatel SCPs provide PN and VPN services, and Stratus SCPs provide A-080 service developed by IN Project of CHT-TL. To the end of uniform access of IN services, all SSPs should be able to communicate with all SCPs using INAP/SS7 protocol stacks[9-12]; that is, multi-vendor integrations of SCPs and SSPs has to be done. The benefits of such integrations are remarkable in both new service deployments and IN network management.

In the processes of PN, A-080, and VPN service deployment, multi-vendor integrations of IN services and their access platform in terms of adherence to the commonly recognized international standards are regarded as one of the major goals. The first step of IN service deployment is to define the specification of INAP. The specification of CHT-LDM INAP is defined based on ETS 300 374-1[3]. The definition of specification includes (1) selection of INAP operations, (2) selection of optional parameters of each operation, (3) specifying the ranges of parameter values for all selected parameters, (4) defining the formats of Network Operator Specific (NOS) parameters.

Attribute to the accomplishment of SS7 interworking tests in the past years, the testing part of IN service deployment can be focused on INAP. Based on the INAP specification [2], the integration process is divided into three phases: conformance, service feature and interworking tests. First of all, the encoding and decoding capabilities of INAP/SS7 signaling of each node is checked for its conformance to the specification using a protocol emulator. Secondly, Functional Entity Actions (FEAs) corresponding to INAP operation(s), which appear as service features to subscribers, are tested for their functionalities. Then, at service level, the interworking tests of SSPs and SCPs are conducted by running down a list of test cases item by item for all combinations of SSPs and SCPs.

In all the three testing phases, problems are found, clarified, and solved after discussions and negotiations with the vendors. These problems can be classified into the following categories by their nature: (1) Information Element (IE) encoding and

0-7803-7047-3/01/$10.00 (C) 2001 IEEE

decoding error, (2) parameter decoding failure, (3) parameter value error, (4) parameter default value error, (5) functionality error, and (6) ACN negotiation error.

In this paper, the definition of CHT-LDM INAP specification for the 3 services mentioned above is first described. Next, three phases of protocol tests are described one by one. The problems and solutions are presented in the following section. For the goal of successful INAP interworking, some suggestions on INAP implementation are made in the final section.

II. DEFINITION OF CHT-LDM INAP SPECIFICATION

The definition of INAP specification, which is based on ETSI ETS 300 374-1 [3] and the related ITU-T standards [1,2], includes (A) selection of INAP operations, (B) selection of optional parameters of each operation, (C) specifying the ranges of parameter values for all selected parameters, (D) defining the formats of NOS parameters.

A. Selection of INAP operations.

In the selection of INAP operations, service features that are provided by a service have to be considered. There are more than ten service features provided by PN, A-080, and VPN services collectively. Among them, only five involve communications between SCP and SSP, as listed in the following:

(1) Call Prompt (CP)
(2) Courtesy Response (COR)
(3) Alternative Destination on Busy (ADOB)
(4) Alternative Destination on No Reply (ADONR)
(5) Multiple Calls (MC)

With the above four service features, the Basic Call Processing (BCP) capability required for call setup, and FCI for billing, the selected INAP operations are as listed in Table I.

TABLE I
CHT-LDM INAP OPERATIONS

No	Operations	Abv.	F.E.
1.	Connect	CON	SSP
2.	ConnectToResource	CTR	SSP
3.	DisconnectForwardConnection	DFC	SSP
4.	EventReportBCSM	ERB	SCP
5.	FurnishChargingInformation	FCI	SSP
6.	InitialDP	IDP	SCP
7.	PlayAnnouncement	PA	IP
8.	PromptAndCollectUserInformation	PC	IP
9.	ReleaseCall	RC	SSP
10.	RequestReportBCSMEvent	RRB	SSP
11.	SpecializedResourceReport	SRR	SCP

B. Selection of optional parameters of each operation.

The selection of optional parameters is done by excluding those that are not implemented or required by the services from the basis definition of ETS 300 374-1[1]. For example, in the following ASN.1[6] definition of parameters of InitialDP operation, parameter cGEncountered is excluded from the definition of CHT-LDM INAP[8].

InitialDPArg ::= SEQUENCE{
servicekey [0] Servicekey OPTIONAL,
calledPartyNumber [2] CalledPartyNumber OPTIONAL,
callingPartyNumber [3] CallingPartyNumber OPTIONAL,
~~cGEcountered [7] CGEcountered OPTIONAL,~~
iPSSPCapabilities [8] IPSSPCapabilities OPTIONAL,
originalCalledPartyID [12] OriginalCalledPartyId OPTIONAL,
......}

C. Specifying the ranges of parameter values

For each one of the selected parameters, the range of its value has to be decided such that both communicating entities would not encounter any unexpected value in the received INAP messages. In the beginning of this stage, the submitted PICS [4] of each vendor are first reviewed and compared, and in the following meetings with all the involved vendors, discussions and negotiations are undertaken to lead to the final decisions on the ranges of disputed parameters(e.g., some parameters of InitialDP operation as listed in the following table).

TABLE II
FORMATS AND VALUE RAANGES OF PARAMETERS

	ETSI	Vendor A	Vendor B	CHT-LDM
InitialDP				
serviceKey	$0..2^{31}$-1	except 0	$0..2^{31}$-1	$1..2^{31}$-1
iPAvailable	NOS	1 BYTE	1 BYTE	1 BYTE
iPSSPCapabilities	NOS	4 BYTE	1 BYTE	4 BYTE
AdditionalCalling PartyNumber	Octet String	OK	UP TO 18 digits	UP TO 18 digits
eventTypeBCSM	1..10,12..18	except 8&16	2..7,9,10	2..7,9,10
...				

D. Defining the formats of NOS parameters.

NOS parameters are those that cannot be defined for all

scenarios until the time they are used in an implementation. In addition to the two NOS parameters shown in the above table, chargingCharachateristics is an indispensable NOS parameter of FCI operation for billing. The definition of the format of each NOS parameter includes both its syntactical and semantic usages.

III. PROTOCOL TESTS

Before the protocol tests can be described, IN network model has to be specified. The model of IN of CHT-LDM follows ETS 300 374-1[3], as shown in Figure 1.

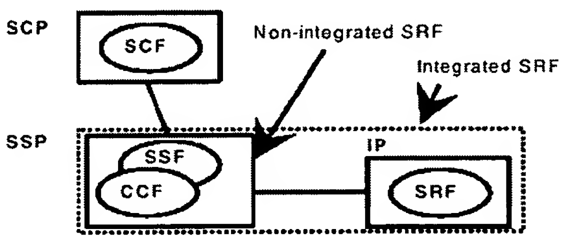

Fig. 1. IN model of assist with relay SSP

A. *Conformance tests.*

The purpose of conformance tests is to verify that each Functional Entity(FE, i.e., SCP or SSP) has the capabilities to decode all the parameters in the received INAP messages and to correctly encode the messages required for communications with its counterpart in providing a service. In this phase, the tests can be done by reviewing the PICS [4] provided by the vendors to find out the deviations, if any. The Test Suite Structure and Test Purposes Specification for SSF and SRF [5] is consulted but not adopted due to the tremendous efforts it requires. The actual tests of encoding and decoding are naturally included in service feature tests.

B. *Service feature tests.*

The service feature tests are performed on both SCPs and SSPs (including the associated IP). In addition to the testing of encoder and decoder of the System Under Test (SUT) as mentioned before, value ranges of parameters can also be checked in this phase. Nevertheless, the main purpose is functionality test of SUT.

1) Test Architecture: For the testing of an SCP, a protocol emulator is used as an SSP; for that of an SSP, the protocol emulator is used as an SCP. The architecture are as shown in Fig. 2.

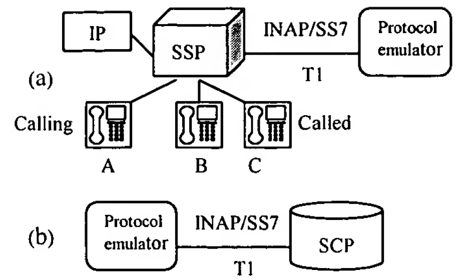

Fig. 2. (a) SUT: SSP, (b) SUT: SCP

2) Test Cases: The five service features listed in Section II are involved in the test. The INAP message flows correspondent to each of service features are illustrated with the following figures.

(1) Call Prompt (CP)
(2) Courtesy Response (COR)
(3) Alternative Destination on Busy (ADOB)
(4) Alternative Destination on No Reply (ADONR)
(5) Multiple Calls(MC)

3) Functionalities of Service Features: The functionalities (or Functional Entity Actions, FEAs) associated with the service features are listed as check items for this test. These items are quite different on different FE. On SSP, functionalities show themselves in the results of the tests while on SCP, the FEAs has to be checked by running monitoring log. The order of check sequence of this test is significant to the efficiency of test. We believe that the following sequence is a good one to clarify and pinpoint the problems in the test:

(1) Try to pinpoint the source of problem by test result, including error messages,
(2) Verify the INAP messages including parameters, and values of parameters,
(3) Check FEAs in the monitoring log of SUT.

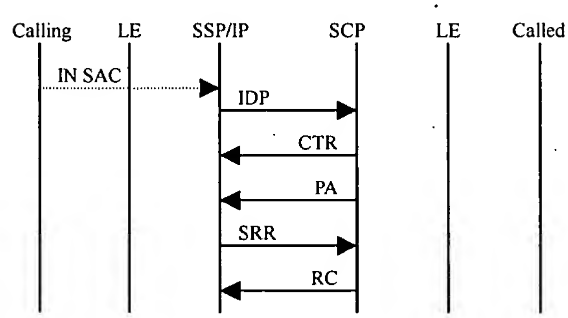

Fig. 3. Courtesy Response

The expected result of this test case on SSP is that calling party A hears the voice of a prearranged announcement and then disconnected; on SCP, no error message appears in the message flow.

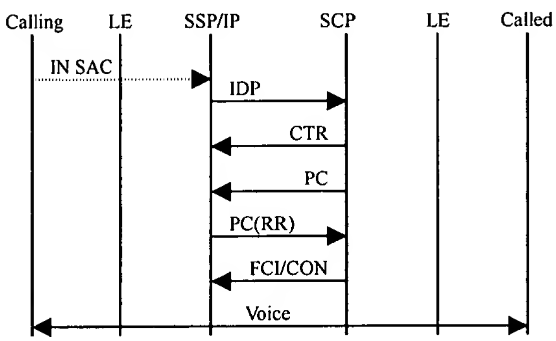

Fig. 4.Call Prompt & BCP

The expected result of this test case on SSP is that calling party A (1) hears a voice prompt, (2) key in some digits, and then connected to the called party; on SCP, no error message appears in the message flow. In addition, a CDR is created in response to FCI.

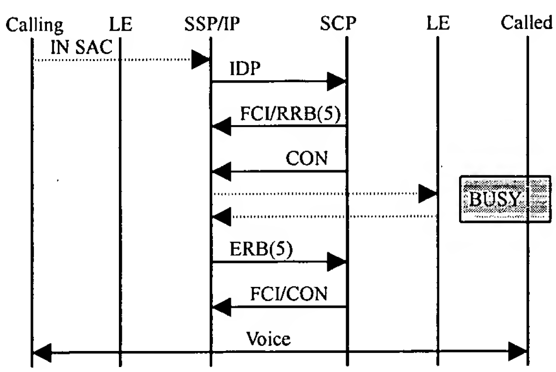

Fig. 5 ADOB

The expected result of this test case on SSP is that calling party A is connected to the called party C after failing to reach called party B(Off Hook); on SCP, no error message appears in the message flow. In addition, a CDR is created in response to FCI.

The expected result of ADONR test case on SSP is that calling party A is connected to the called party C after waiting for the reply of called party B (e.g., 20 sec.); on SCP, no error message appears in the message flow. In addition, a CDR is created in response to FCI.

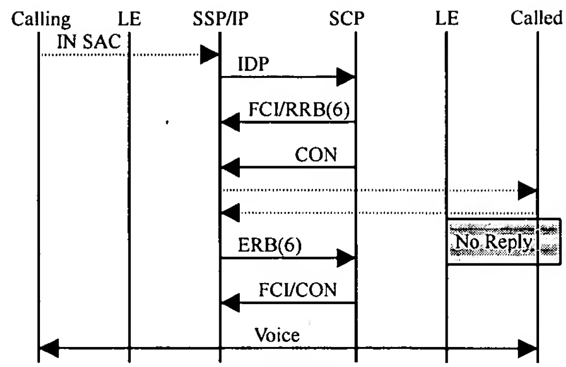

Fig. 6 ADONR

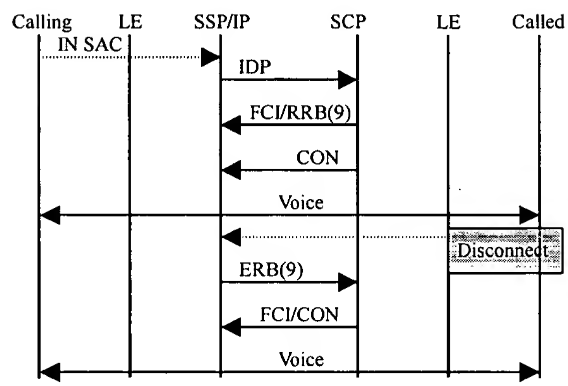

Fig.7 Multiple Calls

The expected result of ADONR test case on SSP is that calling party A is connected to the called party C after waiting for the reply of called party B (e.g., 20 sec.); on SCP, no error message appears in the message flow. In addition, a CDR is created in response to FCI.

The expected result of Multiple Calls test case on SSP is that calling party A is connected to the called party B for a duration of conversation and then connected to called party C after the conversation ends; on SCP, no error message appears in the message flow. In addition, a CDR is created in response to FCI.

C. *Interworking tests*

Following the completion of service feature tests, interworking tests are to be conducted in IN network. Before the tests can be done, some network configurations have to be arranged.

1) Test Architecture: As shown in Fig. 8, all the five nodes in

the network need to be configured (e.g., ODD for triggering of the tested IN service needs to be established on SSPs).

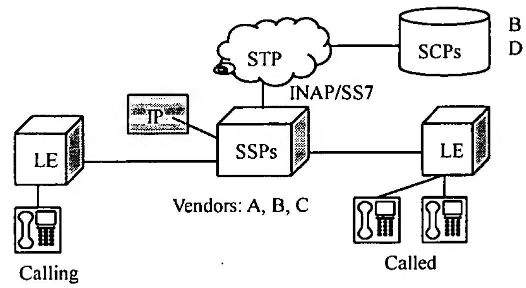

Fig.8 Architecture of interworking tests

2) Test Cases: When the Service Logic Program (SLP) of an SCP is ready for test, interworking test can be done by running down the test items arranged in the test plan; otherwise, SCP's place can be taken by the protocol emulator used in the last phase and the test cases are reused again.

In the phase of interworking tests, the focus is on the network-wide and service-wide events, instead of single service feature or node. However, the source(s) of problem(s) in the test spans all service features and all nodes, which explains the necessity of service feature tests. Only when service feature tests had been successfully completed, the focus of following interwroking tests could be put on network-wide and service-wide events, such as Call Detail Record (CDR).

IV. PROBLEMS AND DISCUSSIONS

In all the three testing phases, problems are found, clarified, and solved after discussions and negotiations with the vendors. They are listed in the following tables., in which X-Y interworking denotes the interworking between SSP (by Vendor X) and SCP (by Vendor Y).

TABLE III
A-B interworking

Problems	INAP/TCAP	Sender	Receiver	Remarks
1. ACN	Dialogue Portion of TCAP	SSP	SCP	ACN refused by SCP[6]
2. forwardCallIndicator	IDP	SSP	SCP	decoding error[2]
3. legID	RRB	SSP	SCP	incorrect value[3]
4. iPSSPCapability,iPAvailable	IDP	SSP	SCP	nos parameter not implemented[5]
5. cancelDigit, endOfReplyDigit	PC	SCP	SSP	incorrect values[3]
6. variableParts	PA	SCP	SSP	functionality not ready[5]
7. maximumNumberOfDigit	PC	SCP	SSP	value out of upper bound[3]
8. TC_CONTINUE with empty component	TCAP	SCP	SSP	programming error[1]

TABLE IV
A-D interworking

Problems	INAP/TCAP	Sender	Receiver	Remarks
9. Three parameters of AARE (indefinite form)	Dialogue Portion of TCAP	SCP	SSP	decoding error[1]
10. Message length (indefinite form)	TCAP	SCP	SSP	decoding error[1]
11. iPSSPCapability and iPAvailable	IDP	SSP	SCP	NOS parameter not implemented[5]
12. cancelDigit, endOfplyDigit	PC	SSP	SCP	misintepretation of values[4]
13. variableParts	PA	SCP	SSP	functionality not ready[5]
14. Link ID of TCAP Invoke Component	PA	SCP	SSP	encoding error (link ID of SRR)[1]

TABLE V
B-D interworking

Problems	INAP/TCAP	Sender	Receiver	Remarks
15. VoiceBack & voiceInfomation	PC	SCP	SSP	decoding error[2]
16. iPSSPCapability and iPAvailable	IDP	SSP	SCP	NOS parameter not implemented[5]
17. additionalCallingPartyNumber	IDP	SSP	SCP	decoding error[2]
18. NOS parameter of FCI	FCI	SCP	SSP	misinterpretation of values[5]

A. Problems

These problems can be classified into categories by their nature: (1) IE encoding and decoding error, (2) parameter decoding failure, (3) parameter value error, (4) parameter default value error, (5) functionality error, and (6) ACN negotiation error. In the above three tables, the category of a problem is denoted by the superscript in the remark of the row. For the goal of successful INAP interworking, some suggestions on INAP implementation are made, after the discussions on these problems.

B. Discussions

1) *IE encoding and decoding error.* The format of An IE is a triplet (T, L, V). The type of an IE can be either a primitive or a constructor). The length encoding of an IE of constructor type can be in either definite or indefinite form, as specified in BER [7]. The problems encountered are that the receiver had trouble decoding the length of a constructor IE in TCAP message. Trouble-shooting procedure consists of the sequence of three steps mentioned earlier:

(1) Try to pinpoint the source of problem by the only error messages "**TCAP P-Abort,**"
(2) Verify the TCAP messages including parameters, and values of parameters,
(3) Check FEAs in the monitoring log of SUT.

In step (2), after making a scrutiny into the TCAP message again and again, we came up with a doubt on the part of indefinite length encoding of constructor IEs. A protocol emulator was then used to prove the doubt by sending the same message of all definite length encoding to the SUT. The doubt was proved; the problem was clarified and passed to the vendor. The other problems classified in this category are explained in the remarks.

2) *Parameter decoding failure.* The problems of this category are that an SUT failed to decode (or recognize) some optional parameters of INAP messages and caused the abortion of communication transaction.

3) *Parameter value error.* The problems of this category are that an SUT is unable to perform the corresponding FEA due to the unexpected value(s) of parameter(s) in the received INAP message and has the transaction aborted.

4) *Parameter default value error.* Same as mandatory parameters, parameters with a default value are not explicitly specified by the word "OPTIONAL" in the INAP definition of ASN.1 syntax [6] and may be misinterpreted as the former. They are explicitly specified by the keyword "DEFAULT" followed by a value which is to be assumed by the receiver when they do not appear in the carrying INAP messages. On the other side, a sender has the choice of sending or not sending a parameter with a default value when the value of that parameter coincides with the default value. Otherwise, when it has a value different from the default one, the sender has to send the parameter. The problems of this category are that an SUT assumed incorrect default value(s) for the parameter(s) listed above and performed unexpected functionalities.

5) *Functionality error* The problems of this category are that an SUT failed to perform expected functionalities due to implementation errors or late implementation.

6) *ACN negotiation error.* ACN is carried in the optional dialogue portion of TCAP message which contains **InitialDP** message in the component portion sent by an SSP to initiate a communication transaction with SCP. It is literally the version name of INAP which SSP proposes to SCP as communication protocol. This problem was encountered when SCP-B refused the ACN proposed by SSP-A. The problem was solved after discussions and negotiations with the vendors, and we have our ACN uniquely defined.

V. SUGGESTIONS

Based on the experiences in the trouble-shooting of problems encountered in this run of integrations, some suggestions on the implementations of INAP (or even all protocols) are proposed for the goal of successful system interworking.

1) *Encoding and Decoding of IE.* Both the encoding of all IE on a sender and the decoding on a receiver follow the specification of BER[7].

2) *Decoding of Optional Parameters.* The decoding procedure of a receiver be able to decode all the optional parameters defined in the specification of ETS 300 374-1[3] and all the related standards.

3) *Decoding of Private Parameters.* The decoding procedure of a receiver ignore or discard all the private parameters (class 3) and go on the following processing (FEA) as long as the encoding follows BER [7].

4) *Decoding of Private Parameters.* The decoding procedure of a receiver ignore or discard all the undefined context-specific parameters (class2) and go on the following

processing (FEA) as long as the encoding follows BER [7].

5) *ACN negotiation*. Both SSP and SCP be able to deactivate ACN negotiation procedure by system configuration.

LIST OF ACRONYMS

ACN	Application Context Name
BER	Binary Encoding Rule
FE	Functional Entity
FEA	Functional Entity Action
IN	Intelligent Network
INAP	Intelligent Network Application Protocol
NOS	Network Operator Specific
PN	Personal Number
SCP	Service Control Point
SLP	Service Logic Program
SS7	Signaling System No. 7
SSP	Service Switching Point
STP	Signal Transfer Point
VPN	Virtual Private Number

ACKNOWLEDGMENT

Thanks go to all the managers and engineers of the vendors involved in this run of SSP-SCP integrations and all the colleagues of CHT who contribute to the success of this operation.

REFERENCES

[1] ITU-T Q.1214, Distributed Functional Plane for Intelligent Network CS-1, 1995.

[2] ITU-T Q.1218, Interface Recommendation for Intelligent Network CS-1, 1995.

[3] ETS 300 374-1, ETSI ETS 300 374-1, Intelligent Network CS-1 Core INAP, Part 1: Protocol Specification, 1994.

[4] ETS 300 374-2, ETSI ETS 300 374-2, Intelligent Network CS-1 Core INAP, Part 2 : PICS proforma specification for SSF, SRF and SCF, 1994.

[5] ETS 300 374-3, ETSI ETS 300 374-3, Intelligent Network CS-1 Core INAP, Part 3: Test Suite Structure and Test Purposes (TSS&TP) Specification for SSF and SRF, 1996.

[6] ITU-T X.208 Abstract Syntax Notation 1, ASN.1.

[7] ITU-T X.209 Basic Encoding Rule, BER.

[8] CHT-LDM INAP, Intelligent Network CS-1 Core INAP: Protocol Specification, 1997..

[9] ITU-T Q.761, Functional Description of the ISDN User Part of Signaling System No.7, 1993.

[10] ITU-T Q.762, General Function of Messages and Signals of the ISDN User Part of Signaling System No.7, 1993.

[11] ITU-T Q.763, Formats and Codes of the ISDN User Part of Signaling System No.7, 1993.

[12] ITU-T Q.764, Signaling System No.7 - ISDN User Part of Signaling Procedures, 1993.

4. The Lucent Technologies Online Communications Center

4.1. Overview

The Lucent Technologies Online Communications Center (OCC) is an Intelligent Network (IN)-based platform that supports the Internet call waiting service. Its basic components are the OCC Server and OCC Client, which are described in detail in the Architecture section. The OCC Server interacts with the PSTN entities over the secure intranet via plain-text Session Initiation Protocol (SIP) messages [**2**]. With the PC Client, the OCC Server interacts via encrypted SIP messages.

The OCC Server run-time environment effectively consists of two multi-threaded processes responsible for Call Registration and Call Notification services, respectively.

OCC call registration services are initiated from an end-user's PC (or Internet appliance). With those, a subscriber registers his or her end-points and activates the notification services. (The registration services are not, strictly speaking, SPIRITS services but rather have a flavor of PINT services.)

All OCC call notification services are PSTN-initiated. One common feature of these services is that of informing the user of the incoming telephone call via the Internet, without having any effect on the line already used by the modem. (A typical call waiting tone would interrupt the Internet connection, and it is a standard practice to disable the "old" PSTN call waiting service for the duration of the call in support of the Internet connection between the end-user and the ISP.)

When a call comes in, the user is presented with a pop-up dialog box, which displays the caller's number (if available), name (again, if available), as well as the time of the call. If the called party does not initiate an action within a specified period of time the call is rejected.

As far as the disposition of the call is concerned, OCC supports all the features described in Section 2.

4.2. Architecture

```
           +------------+
           | Compact    |         +-------------+
           | Service    |         | Service     |
     +-----| Node (CSN) |         | Management  |
```

```
      |     | OCC Server |          | System (SMS)|
      |     | OCC CSN SPA|          +-------------+
      |     +-------:--|-+                |
      |             |  +-------------[ IP INTRANET ]---------+
    ===== firewall  :                                        |
      |             |                                        |
      |           +-------+                              +-------+
      |           |Central|-..-..-..-..-..-..-..-..-..-..-|Service|
      |       +-%-|Office |-..-..-:                      |Control|
      |       |   +---|---+       |                      |Point  |
      |       %       |           :                      | (SCP) |
      |       |    +--|---+   +-------+    +-----------+ |OCC SCP|
      |       %    | PC   |   | VoIP  |    | VoIP      | |  SPA  |
      |       |    |OCC Cl|   |Gateway|    |Gatekeeper| +-------+
      |       %    +------+   +---|---+    +-----|----+
      |       |                ===== firewall =====
      |       %                    |             |
      |       |   +----------------|---+         |
      |       +-%-|                    |----------+
      +----------|  I N T E R N E T   |
                 |                    |
                 +--------------------+
```

Figure 8: The Lucent OCC Physical Architecture

Figure 8 depicts the joint PSTN/Internet physical architecture relevant to the OCC operation. The Compact Service Node (CSN) and SCP are Lucent's implementations of the ITU-T IN Recommendations (in particular, the Recommendation Q.1205 where these entities are defined) augmented by the requirements of Bellcore's Advanced

Intelligent Network (AIN) Release 1.0) and equipped with other features. The Central Office (CO) may be any switch supporting the Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) and the call forwarding feature that would allow it to interwork with the CSN. Alternatively, in order to interwork with the SCP, it needs to be an IN Service Switching Point (SSP). In the latter case, the central office is connected to the SCP via the signaling system No. 7 (SS7) and INAP at the application layer.

The Service Management System (SMS) is responsible for provisioning of the SCPs, CSNs, and central offices. In particular, for IN support of the Internet Call Waiting, it must provision the Central Office to direct a terminating attempt query to the subsystem number corresponding to the OCC SCP SPA based on the Termination Attempt Trigger (TAT). In addition, the Subscriber Directory Number (DN), Personal Identification Number (PIN) and Language ID are provisioned for each subscriber into the OCC Subscriber entry of the SCP Real Time Data Base (RTDB). Figure 9 shows the structure of an RTDB entry.

```
+-------------------------------------------------------+
|DN | PIN | IP Address | Session Key | CNF | Language ID|
+-------------------------------------------------------+
```

Field Descriptions:

(DN) Directory Number - the subscriber's telephone number

(PIN) Personal Identification Number - the subscriber's password

IP Address - Internet Protocol Address of the subscriber

(CNF) Call Notification In Progress Flag (boolean) - the flag indicating if an attempt to notify the subscriber of a call is currently in progress

Session Key - unique identifier for the current registration session of the subscriber

Language ID - language identifier for the subscriber

Figure 9: Structure of the RTDB Subscriber Record

The Central Office, SMS, CSN, and SCP are the only PSTN elements of the architecture. The other elements are VoIP Gateway and Gatekeeper defined in the ITU-T Recommendation H.323, whose roles are to establish and provide the part of the voice path over IP. The Central Office is explicitly connected to the VoIP Gateway via the

ISDN PRI connection. In this architecture, CSN, VoIP Gateway, and VoIP Gatekeeper are the only entities connected to the Internet, with each respective connection protected by a firewall. The CSN and SCP are interconnected via a secure IP Intranet. There may be more than one CSN or SCP (or both) (and the SCPs come in mated pairs interconnected by X.25, anyway) in a network, but these details are not essential to the level of description chosen for this document. However, we note that load balancing and adaptation to failures by the use of alternative nodes is incorporated into the architecture.

When someone attempts to call the subscriber, the central office serving that subscriber interrupts normal termination processing and notifies the SCP which, in turn, can check whether that subscriber has registered that he (or she) is logged onto the Internet. Exploiting the standardized layering of service logic that characterizes the intelligent network, the central office will do this without requiring the installation or development of any central office software specific to OCC. The central office is simply provisioned to query the SCP when there is a termination attempt (i.e., TAT) directed to the subscriber's directory number. (Note that the Central Office has no bearer circuit connection to the SCP, only a signaling one over SS7).

TCP/IP communication between the SCP and CSN utilizes a secure intranet. The subscriber, of course, is assumed to have access only to the Internet.

The intelligent network entities, the SCP and CSN, do have OCC related software. The OCC server is implemented on the CSN. In addition, one service package application (SPA) is installed on the SCP. Another SPA is located in the CSN and is needed only when the subscriber elects to accept an incoming call using voice over IP.

The OCC Server is a collection of Java servers on the CSN whose responsibilities include:

- Listening for incoming Call Notification (TCP/IP) messages from the SCP SPA.

- De-multiplexing/multiplexing incoming Call Notification messages sent from the SCP SPA.

- Relaying messages between the OCC Client and the SCP SPA.

o Listening for and authentication of OCC Client requests for service registration.

o Handling encryption/decryption of messages exchanged with the OCC Client, and generating session-specific encryption/decryption keys.

The OCC Client is a collection of software components that run on the Subscriber's PC. Its components include the SIP User Agent Server (which handles the exchange of SIP messages with the OCC Server and invokes the Call Notification pop-up window) and a daemon process that monitors the Point-to-Point Protocol (PPP) actions and is responsible for starting and stopping the SIP User Agent Server.

4.3. Protocol and Operations Considerations

The OCC Server uses distinct TCP/IP ports configured on the CSN to

o Listen for incoming SIP REGISTER messages (in support of registration service) sent from the OCC Client.

o Listen for incoming SIP INVITE messages (in support of call notification service) sent from the SCP.

During call notification, the SCP SPA is the client and thus is started after the OCC Server has been started. The SCP SPA and OCC Server exchange SIP messages over TCP/IP (via the Secure Intranet) using a "nailed-up" connection which is initiated by the SCP SPA. This connection is initiated at the time the SCP SPA receives the very first SIP REGISTER request from the OCC Server, and must prevail for as long as the SPA is in the in-service state. The SCP SPA also supports restarting the connection after any failure condition.

The OCC Server supports multithreading. For each Call Notification/Call Disposition event, a separate thread is used to handle the call. This model supports multi-threading on a "per message" basis where every start message (SIP INVITE) received from the SCP SPA uses a separate thread of control to handle the call. Subsequent messages containing the same session Call-ID (which includes the SPA's instance known as "call_index" and the SCP hostname) as the original start message is routed to the same thread that previously handled the respective initiating message.

The OCC Server dynamically opens a new TCP/IP socket with the OCC Client for each Call Notification/Call Disposition session. This socket connection uses the IP address and a pre-configured port on the PC running the OCC Client software.

For session registration, the OCC Server dynamically opens TCP/IP sessions with the SCP SPA. The SCP SPA listens at a pre-configured port to incoming SIP REGISTER messages sent by OCC Clients via the

OCC Server. To exchange SIP messages with the OCC Server, the OCC Client dynamically opens a TCP/IP socket connection with the OCC Server using a pre-configured port number on the CSN and the CSN's IP address.

For the VoIP Scenario, the CSN SPA, acting as a client, dynamically opens TCP/IP sessions with the SCP that handled the initial TAT query. As soon as the CSN SPA has successfully made the correlation and connected the two incoming call legs pertaining to a VoIP call

back, the SIP 180 RINGING message will be sent back to the SCP SPA running on the actual SCP that instructed the SSP to forward the Caller to the CSN. This SIP message, which contains the VoIP Call Back DN dialed by one of the bridged call legs, is an indication to the SCP SPA that the VoIP Call Back DN is freed up.

A typical subscription scenario works like as follows:

1. Each VoIP Gateway is provisioned with a list of authorized VoIP Call Back DNs, each terminating on a particular CSN. These special DNs are used when an on-line subscriber elects to receive an incoming call via VoIP. In particular, they assist in routing an outgoing call from the subscriber's NetMeeting to the particular CSN to which the SCP is (roughly concurrently) forwarding the incoming call. (These two calls are joined in the CSN to connect the incoming call to the subscriber's Netmeeting client.) Furthermore, these special DNs permits that CSN to associate, and hence bridge, the correct pair of call legs to join the party calling the subscriber to the call from the subscriber's NetMeeting client.

2. The subscriber calls a PSTN service provider and signs up for the service.

3. An active Terminating Attempt Trigger (TAT) is assigned to the subscriber's DN at the subscriber's central office.

4. The PSTN service provider uses the SMS to create a record for the subscriber and provision the Subscriber DN and PIN in the OCC RTDB table in the SCP.

5. The subscriber is provided with the OCC Client software, a PIN and a file containing the OCC Server IP Addresses.

Finally, we describe the particular scenario of the OCC Call Disposition that involves voice over IP, which proceeds as follows:

1. The OCC subscriber clicks on "Accept VoIP".

2. The OCC Client sends a "SIP 380 Alternative Service" message to the OCC Server. This message includes a reference to the Call Back DN which will ultimately be used by the CSN to associate the call leg (soon to be initiated by the subscriber's NetMeeting) connecting to the subscriber (via the VoIP gateway) with the PSTN call leg connecting to the calling party.

3. The OCC Server closes the TCP/IP session with the OCC Client and sends to the SCP SPA the "SIP 380 Alternative Service" message which includes the Call Back DN.

4. The SCP SPA instructs the Central Office to forward the call incoming to the subscriber to the CSN. This instruction includes the Call Back DN.

5. The SSP forwards the Caller to the CSN referencing the Call Back DN. Note that the Call Back DN, originally assigned to the OCC client by the SCP when the subscriber was alerted to the presence of an incoming call attempt, flowed next to the OCC server when the client elected to receive the call via VoIP, then to the SCP, then to the central office in association with a SCP command to forward the incoming call to the CSN, then to the OCC server on the CSN in association with that forwarded call.

```
6.  Meanwhile, the OCC Client extracts 1) the VoIP Call Back DN from
    the SIP INVITE message received during Call Notification and 2)
    the H323UID and H323PIN values from its properties file and
    updates the 'netmtg.cnf' file.

7.  The NetMeeting application is launched and sets up a connection
    with the VoIP Gateway.

8.  Once a connection is established between NetMeeting and the VoIP
    Gateway, NetMeeting initiates a phone call - passing to the VoIP
    Gateway the Call Back DN as the destination DN.

9.  The VoIP Gateway consults the VoIP Gatekeeper and authenticates
    the NetMeeting call by verifying the H323UID and H323PIN values,
    and by ensuring the called DN (i.e., Call Back DN) is authorized
    for use.

10. After passing the authentication step, the VoIP Gateway dials
    (via PSTN) the Call Back DN and gets connected to the CSN.  The
    CSN notes that it was reached by the particular Call Back DN.

11. The CSN bridges the Calling and Called parties together by
    matching on the basis of the Call Back DN.

12. The CSN notifies the SCP (SIP 180 Ringing) of status and
    references the Call Back DN so that the SCP can reuse it for
    other calls.

13. If the central office supports that two B-channel transfer
    (Lucent, Nortel, and perhaps other central office vender's do),
    an optimization is possible.  The CSN can have the central office
    rearrange the topology of the newly connected call in such a way
    that it flows only through the central office and no longer
    through the CSN.
```

ZVON > RFC Repository > RFC 2995

Frontpage / Contents

Prev | Next | RFC index | RFC search

Lucent Technologies introduces personal assistant technology for the broad consumer and business markets

FOR RELEASE WEDNESDAY JANUARY 27, 1999

WASHINGTON, D. C. - Lucent Technologies (NYSE: LU) today introduced the first mass market personal productivity software tool which uses spoken commands to control and screen incoming phone calls, simplify outbound calls and manage voice mail. The Lucent Personal Assistant delivers easier to use, lower-cost virtual assistant technology than was previously available, and is designed for both consumer and business markets. Personal Assistant is available for telephone and mobile service providers, who install the software in their networks and then offer service subscriptions to their customers. The announcement was made here today at ComNet '99, an annual exhibition for the networking and telecommunications industries.

`Personal Assistant combines Lucent's cost-effective Intelligent Network platform and unique Bell Labs speech processing technology to create a simplified, lower-cost service than previous personal/virtual assistant offerings. Unlike complex assistant services that bill by the minute and appeal only to limited niche markets, Lucent's intuitive Personal Assistant is designed to be offered for a low monthly subscription to the sizable home and business telephone markets, as well as the growing legion of mobile users.

Lucent created a user-friendly personal assistant service by avoiding needless complexity, concentrating instead on the basic functions of an assistant:

Screen calls-Personal Assistant answers incoming calls, identifies who is calling, then lets users respond by voice to answer a given call or to instruct the assistant to send the call to voice mail. Place calls-Personal Assistant allows subscribers to dial calls by simply speaking a name or phone number.

Take messages-Personal Assistant streamlines voice mail playback by grouping messages by caller's names (e.g., "You have two messages from John Smith and one message from Mary Jones"), then allowing the subscriber to quickly select by voice which messages he or she wants to hear (e.g., "Play the message from Mary Jones").

Find the subscriber as needed-Personal Assistant uses call forwarding or sequential ringing (ringing phones in different locations in a particular order) to locate subscribers and notify them of an incoming call, even if they are already on a different call.

"Personal Assistant leverages critical technologies developed across several Lucent businesses, including

Intelligent Networking software, speech recognition from Bell Labs and voice messaging from the Octel unit," said Lance Boxer, group president, communications software, Lucent Technologies. "The combined technologies are specifically designed with broad home and office usability and affordability, which is also attractive for communications providers seeking new, revenue-enhancing service offerings for their subscribers."

Personal Assistant also addresses the call management needs of business users, who struggle to keep up with the crush of calls and voice mail. Additionally, Personal Assistant's simplicity is intended to appeal to the average home user, who has become more protective of personal privacy and is seeking to control interruptions to personal time. Personal Assistant is also a vast improvement for mobile users, who often find themselves working from their cars, where constantly entering keypad commands can be difficult. Personal Assistant's spoken, hands-free interface is a more-efficient method for mobile communications.

To further promote the mass market acceptance of the virtual assistant concept, Lucent will make selected features of Personal Assistant, such as Voice Dialing and Call Screening, available as stand-alone, Intelligent Network-based services. This building block approach allows service providers to offer targeted services that reflect the specific needs of a variety of markets. The end result is a unique suite of assistant services that build on users' existing experience, allowing subscribers to easily migrate to the complete Personal Assistant service over time.

Deployed on Lucent's standards-based Intelligent Network Service Node or Compact Service Node, Personal Assistant will operate on a variety of fixed and mobile communications networks throughout the world. Lucent's proven Intelligent Network platforms provide the reliability and scalebility needed to deploy revenue generating services such as Personal Assistant to expanding markets. Personal Assistant also leverages international language expertise from Bell Labs and Lucent Speech Solutions, allowing Lucent to offer future versions of the service optimized for common languages in North America, South America and Europe.

A market trial version of Personal Assistant is currently available on a limited basis to North American service providers.

ABOUT LUCENT TECHNOLOGIES

Lucent Technologies, headquartered in Murray Hill, N.J., designs, builds and delivers a wide range of public and private networks, communications systems and software, data networking systems, business telephone systems and microelectronic components. Bell Labs is the research and development arm for the company. More information about Lucent Technologies is available on the company's Web site at: http://www.lucent.com.

For more information, reporters may contact:

Rich Teplitsky
Lucent Technologies

908-582-5700 (office)
1-800-759-8888, #1080016 (pager)
ComNet '99 DC Booth #856
Email: rteplitsky@lucent.com

Dan Coulter
Lucent Technologies
908-582-3400
Email: mediarelations@lucent.com

View the information and policies regarding Lucent's press release archive.

Ameritech uses Lucent Technologies hardware and software for privacy protection services

FOR RELEASE WEDNESDAY SEPTEMBER 23, 1998

MURRAY HILL, N.J. - Lucent Technologies (NYSE: LU) today announced that it is providing the network hardware and software for Ameritech's new Privacy Manager with Sales Screener service, which give customers more control over incoming calls.

Ameritech's Privacy Manager with Sales Screener-introduced yesterday in Chicago and Detroit-is a breakthrough service that enables residential customers to easily and quickly reject unwanted telemarketing and other unwanted calls.

Privacy Manager will be the first service Ameritech will offer through Lucent's new intelligent network platform, called Compact Service Node/Intelligent Peripheral (CSN/IP). The platform enables Ameritech and other service providers to create and offer a variety of new services to their customers. The three-year, multimillion dollar agreement between the two companies makes Ameritech the first customer for the new platform designed by Lucent's Bell Labs.

"Lucent's hardware and software enables Ameritech to quickly and efficiently offer these new privacy features," said Dave Geary, regional vice president for Lucent Technologies. "Consumers want these options, and we worked with Ameritech to meet the need."

Lucent introduced the CSN/IP platform in March and Ameritech tested it for three months. In addition to the Privacy Manager features, Lucent's CSN/IP enables service providers to offer its customers other advanced features such as voice-activated dialing, message delivery service and intelligent personal agent.

Message delivery service calls the customer to deliver basic information about calls that have come in. Intelligent personal agent follows a customer's spoken instructions to forward calls to another number, take a message or place a call.

Business customers can use the CSN/IP platform to access and update a set of announcements tailored to meet their individual needs automatically and without expensive manual procedures.

The CSN/IP supports a complete complement of voice, data, messaging and multimedia features so that service providers can quickly combine and integrate a wireless, wireline or Internet service provider's network and deliver services such as speech recognition, text-to-speech, fax services and recorded announcements.

The platform's support of Internet protocols enables it to bridge voice and data networks. Information from the Internet can be retrieved and delivered to anyone on the telephone. Conversely, voice calls and data from the switched network can be delivered to emerging data networks.

Lucent's CSN/IP platform-installed in the service provider's central offices and administrative centers-consists of:

- Compact Service Node (CSN) - recognizes and responds to customer requests for services. Lucent's CSN supports nearly all brands of wireline and wireless call-routing switches in service providers' networks.
- Intelligent Peripheral (IP) Manager - collects and stores digitized information about services available to each customer;
- Service Control Point (SCP) - works in conjunction with the CSN to collect information about calls and tell the IP Manager how to handle each call.

Ameritech (NYSE:AIT) serves millions of customers in 50 states and 40 countries. Ameritech provides a full range of communications services, including local and long distance telephone, cellular, paging, security, cable TV, Internet and more. One of the world's 100 largest companies, Ameritech (www.ameritech.com) has 72,000 employees, 1 million shareowners and more than $29 billion in assets.

Lucent Technologies, headquartered in Murray Hill, N.J., designs, builds and delivers a wide range of public and private networks, communications systems and software, business telephone systems and microelectronic components. Bell Labs is the research and development arm for the company. For more information about Lucent Technologies, visit the company's web site at http://www.lucent.com.

For more information, reporters may contact:

Gordon Zwirkoski
Lucent Technologies
908-582-3400
Email: mediarelations@lucent.com

View the information and policies regarding Lucent's press release archive.

Lucent Technologies
Bell Labs Innovations

Hardware and Software

Wireless Network

Flexent® Next Generation Architecture

- Flexent® CDMA Distributed Base Station for PCS Networks
- Flexent® Mobility Server
- Flexent® Application Processor Cluster (APC)
- Flexent® Operations and Maintenance Platform (OMP-FX)
- Flexent® High Density 4.0
- Flexent® One Base Transceiver Station (BTS)
- 5ESS® 2000 Switch Mobile Switching Centre (MSC)
- Executive Cellular Processor (ECP)
- IMS Ring
- Direct Link Node (DLN), Home/Visitor Location Register (H/VLR), Call processing Data Nodes (CDN), Recent Change System (RCS)

Packet Data Network

- 3G-1x and EVDO
- Lucent Packet Control Data Function
- Lucent Packet Inter Working Function (IWF)
- 3Com Packet Data Serving Node (PDSN)

Radio Network

- Flexent® Modular Cell 4.0
- Flexent® Modular Cell 3.0
- Flexent® TDMA Micro Cell for PCS Networks
- Flexent® CDMA Micro Cell for Cellular Networks
- Flexent® CDMA Micro Cell for PCS Networks
- Flexent® CDMA Mod Cell for PCS Networks
- Series II Cell Site
- CDMA/TDMA, AMPS/850/PCS, 2G, 3G

Application Platforms

- Intelligent Network Enhanced Control Server (eCS)
- Intelligent Network Enhanced Media Resource Server (eMRS)
- Intelligent Network Enhanced Services Manager (eSM)
- Intelligent Network Compact Service Node (CSN)

Mobile Applications and Service Delivery

- MiLife™ Intelligent Services Gateway (ISG)
- MiLife™ Short Message Service Center
- MiLife™ SurePay® Solutions Suite

Wireline Network

Circuit Switch

- 5ESS® Switch and 5E-XC™ Applications

Location

- Directions
- Limousine service
- Local hotel directory

Contact Us
Lucent Technologies Network Software Center LIVE Net Facility
2601 Lucent Lane
Lisle, Illinois 60532
Voice (630) 224-2440
Fax (630) 224-2498

- 5E-XC™ Service Rich Software (5E16.1, 5E16.2, 5E17.1)
- 5ESS® Switch Very Compact Digital Exchange (VCDX®)
- Distinctive Remote Module (DRM)
- Access Interface Unit (AIU)
- Access Interface Unit Expansion (EAIU)
- Broadband Access Interface Unit (BAIU)
- Multiplex Access Interface Unit (XAIU)
- SM-2000 (Switching Module 2000)
- One Link Administrative Service Module (ASM)
- 5E-XC™ High Speed Trunking Optical Interface Unit IP / SIP (OIU - IP/SIP)
- 5E-XC™ High Capacity Switching with Communications Module 3 (CM-3)
- Applications Processor TMS-5 and TMS-CDX
- Packet Switch Unit - Unit 2E (PSU2E)
- Dual Packet Switch Unit
- Packet Switch Unit - SS7
- Remote Line Unit (RLU-ESA)
- Communications Assistance for Law Enforcement Act (CALEA)
- Next Generation ISDN CPE Portfolio
- Definity PBX

Access Network

- iMerge™ Centrex Feature Gateway
- iMerge™ Network-based Call Signaling Gateway
- Stinger™ DSL Access Concentrator Family

VOIP

- Lucent Network Controller (LNC)
- Lucent Feature Server 3000
- Cisco Call Manager H323 IP PBX
- Session Initiation Protocol (SIP) Endpoints
- Kagoor Networks™ VoiceFlow 1000

Application Platforms

- AnyPath™ Messaging System
- Octel Voice Mail System
- Intelligent Messaging Architecture - Caller Applications (IMA-CA)
- ClientCare™ Call Center Deluxe Edition (DE)
- Caller Application (CA)
- Enhanced Business Services (EBS)
- NavisRadius™ Authentication Server
- Intelligent Network Enhanced Control Server (eCS)
- Intelligent Network Compact Service Node (CSN)
- Sierra Messaging System
- Billdats Billing System
- Recorded Announcements
- E911 Analog & ISDN Public Safety Answering Points (PSAP)
- Pinnacle ACD
- E911 Service Adjunct (ESA)

Miscellaneous Transmission Bay Equipment

- Telecom Solutions BITS Clock
- Test Bus Control Unit
- Pair Gain Test Controller
- 17A, 16A, and 15A Recorded Announcement Units
- Abacus, Ameritech, PROCALL, and MAGIC Call Generation Equipment

Data Network

Access Gateways

- APX™ 8000 Universal Gateway
- MAX TNT® Universal Gateway
- PacketStar® PSAX 1250 Multiservice Media Gateway
- PacketStar® PSAX 2300 Multiservice Media Gateway
- PacketStar® PSAX 4500 Multiservice Media Gateway
- Ulticom Gateway
- Cisco Media Gateway

xDSL

- AnyMedia® Access System (AMAS) 24 Channel uLaw
- CellPipe® IP Routers
- Stinger™ ADSL/SDSL Access Concentrator Family
- SuperLine™ Access System

Routers

- Juniper M-series Routers
- Cisco Routers
- DynaStar 500 Router
- Cajun P550 Router
- Cajun P333T Ethernet Switch
- Xyplex Ethernet Switch

Software

- VitalSuite® Performance Management Software
- VitalQIP™ DNS/DHCP IP Management Software

ATM Core

- CBX 500™ Multiservice WAN Switch
- GX 550™ Multiservice WAN Switch
- Springtide 7000 Wireless IP Services Switch

Transport Network

- Digital Access Cross-Connect System AX-11 (DACS AX-11)
- Digital Access Cross-Connect System II (DACS II)
- Digital Access Cross-Connect System IV (DACS IV)
- Digital Data Multiplexer Plus (DDM Plus)
- Digital Data Multiplexer 2000 OC-3 (DDM 2000 OC-3)
- Digital Data Multiplexer 2000 OC-12 (DDM 2000 OC-12)
- Digital Networking Unit - SONET (DNU-S)
- DMX Access Multiplexer
- Mercury Echo Canceller
- Symphony - Echo Canceller
- Cadenza - Echo Canceller
- Cadenza II - Echo Canceller
- Tekelec Eagle Signaling Transfer Points (STPs)

- D4 Channel Banks, Acculink Access System
- Subscriber Loop Carrier (SLC) 96, 5, 2K, Connect Reach Fiber Reach

Cable Network

- ARRIS Cadant® C4™ Cable Modem Termination System (CMTS)
- Motorola BSX 64000 CMTS
- Cisco UBR 7200 CMTS
- Other Vendors' Cable Softswitches
- Arris Touchstone™ Telephony Modems 202A Embedded Media Terminal Adapter (EMTA)
- Arris Touchstone™ Telephony Modems 402P/NA-1 EMTA
- Terayon TA102 EMTA
- Scientific Atlanta DBX2203 EMTA
- Motorola SBU-5120 EMTA
- Cisco MGX8800 Trunking Gateway
- Alopa Device Provisioning & Subscriber Management Software
- VitalAccess™ Device Provisioning & Subscriber Management Software
- Enterasys Matrix E and N Series Security Systems
- Dragon GE500 Network Sensor

Home

News Digests

- Service Providers
- Optical Networking
- Packet Systems
- Silicon
- Last Mile
- Start-ups
- Broadband Wireless
- Wireless LANs
- Satellite
- Financial
- Standards Watch
- Regulatory
- Regional News
- Daily Chronology

Search

Blueprints

- Telco Triple Play
- Circuit-to-Packet
- Metro Ethernet
- All Columns
- Tutorials

Directories

- Optical
- Silicon
- Security
- Start-ups
- Geographic

Resources

- White Papers
- Conferences
- Standards Groups

Subscriptions

- FREE Trial
- Subscribe/Renew
- E-mail Format
- Unsubscribe
- Customer Service

Archives

- Archive Search
- Daily Chronology

LUCENT OUTLINES FLEXENT SOFTSWITCH TOLL/TANDEM ARCHITECTURE FOR 3G
Lucent Technologies outlined an IP core architecture for 3G mobile networks that uses a softswit APX 8000 VoIP gateway and PacketStar PSAX Multiservice media gateways to connect circuit-b Mobile Switching Centers with IP or ATM backbones. In a second phase, Lucent plans to evolve softswitch toll/tandem architecture center toward all-IP services run by a network of servers. Two elements will include the Lucent Flexent Mobility Server, open computing platform for managing mobility for the wireless packet core, and Lucent's Flexent Wireless Router, a high-performance r network controller based on cdma2000 and wideband CDMA. The Flexent Mobility servers will incorporate Sun's recently introduced line of Netra Compact PCI servers. Lucent's SpringTide 70 Services Switch would be used for managing data traffic.
http://www.lucent.com/press/0301/010320.nsc.html
Lucent Technologies, March 20, 2001

- In January, Lucent Technologies outlined its plans to pursue a service-intelligent network architecture in which business quality IP services are dynamically established through dire driven, policy-based provisioning of an IP services layer tied into MPLS signaling. Using "service intelligence" in the network, all elements in Lucent's new IP network design would the capability to dynamically recognize and understand the needs of individual users and applications. Lucent intends to extend its service intelligent IP strategy throughout its entir product portfolio, including solutions from its wireless, data, optical, and software business units. A key element in the strategy will be Lucent's SpringTide IP Service Switches.
- In December 1999, Sun Microsystems and Lucent Technologies announced a $500 millior dollar alliance to develop an IP-based mobile network architecture based on Sun Netra se and Bell Labs-developed software.

OIF ADOPTS TWO VERY SHORT REACH (VSR) OC-192 SPECS
The Optical Internetworking Forum (OIF) adopted two more Very Short Reach (VSR) OC-192 inte specifications designed to reduce the cost of high-speed links between equipment in a single cen office (CO). Two other VSR specifications had been adopted in January. The OIF's third VSR sp uses four 2.5 Gbps vertical cavity surface emitting lasers (VCSELs) in each direction on a single fiber ribbon (with 4 unused fibers). It has a reach of up to 300 meters. The solution maps the OC frame onto the parallel optical link with no bandwidth expansion and no overwriting of the SONET overhead bytes. The OIF's fourth VSR spec utilizes a single 850-nanometer vertical cavity surfac

Network Working Group
Request for Comments: 2995
Category: Informational

H. Lu, Editor
I. Faynberg
J. Voelker
M. Weissman
W. Zhang
Lucent Technologies
S. Rhim
J. Hwang
Korea Telecom
S. Ago
S. Moeenuddin
S. Hadvani
NEC
S. Nyckelgard
Telia
J. Yoakum
L. Robart
Nortel Networks
November 2000

Pre-SPIRITS Implementations of PSTN-initiated Services

Status of this Memo

This memo provides information for the Internet community. It does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

Copyright Notice

Abstract

This document contains information relevant to the work underway in The Services in the PSTN/IN Requesting InTernet Services (SPIRITS) Working Group. It describes four existing implementations of SPIRITS-like services from Korea Telecom, Lucent Technologies, NEC, and Telia in cooperation with Nortel Networks. SPIRITS-like services are those originating in the Public Switched Telephone Network (PSTN) and necessitating the interactions of the Internet and PSTN.

Surveying the implementations, we can make the following observations:

- o The ICW service plays the role of a benchmark service. All four implementations can support ICW, with three specifically designed for it.

- o Session Initiation Protocol (SIP) is used in most of the implementations as the base communications protocol between the PSTN and Internet. (NEC's implementation is the only exception that uses a proprietary protocol. Nevertheless, NEC has a plan to support SIP together with the extensions for SPIRITS services.)

- o All implementations use IN-based solutions for the PSTN part.

It is clear that not all pre-SPIRITS implementations inter-operate with each other. It is also clear that not all SIP-based implementations inter-operate with each other given that they do not support the same version of SIP. It is a task of the SPIRITS Working Group to define the inter-networking interfaces that will support interoperation of the future implementations of SPIRITS services.

Table of Contents

1. Introduction

This document contains information relevant to the work underway in The Services in the PSTN/IN Requesting InTernet Services (SPIRITS) Working Group. It describes four existing implementations of SPIRITS-like services from Korea Telecom, Lucent Technologies, NEC, and Telia in cooperation with Nortel Networks. SPIRITS-like services are those originating in the Public Switched Telephone Network (PSTN) and necessitating the interactions of the Internet and PSTN.

Invariably supported by the implementations examined in this document is the Internet Call Waiting (ICW) service. With ICW, service subscribers, while using their telephone lines for Internet access, can be notified of incoming voice calls and specify how to handle the calls over the same telephone lines.

The document first gives a detailed description of the ICW service. Then it proceeds to discuss each of the four implementations. The final sections of the document contains security considerations, the conclusion and references.

It is important to note that even though the term "SPIRITS server" is used throughout the document, it has no universal meaning. Its connotation depends on the context and varies from implementation to implementation.

2. Service Description of Internet Call Waiting

Internet call waiting is the single service that is specifically supported by all the implementations in question. In a nutshell, the

service enables a subscriber engaged in an Internet dial-up session' to

- o be notified of an incoming call to the very same telephone line that is being used for the Internet connection;
- o specify the desirable treatment of the call; and
- o have the call handled as specified.

The details of the ICW service lie in the ways that a waiting call can be treated, which vary from implementation to implementation. In this section, we describe the features that are supported by at least one of the implementations. They are as follows:

- o Incoming Call Notification - The subscriber is notified of an incoming call over the Internet, without having any effect on the telephone line that is being used by the modem. When a call comes in, the subscriber is presented with a pop-up dialog box on the PC. The dialog box may display any combination of the calling party number, calling party name, and calling time. Note that the display of the calling party name (or number) requires the availability of the caller name (or number) delivery feature.

- o Online Incoming Call Disposition - Once informed of the incoming call, the subscriber has various options (indicated in the pop-up window) for handling the call. Possible options are:

  + Accepting the call over the PSTN line, thus terminating the Internet (modem) connection

  + Accepting the call over the Internet using Voice over IP (VoIP)

  + Rejecting the call

  + Playing a pre-recorded message to the calling party and disconnecting the call

  + Forwarding the call to voice mail

  + Forwarding the call to another number

  + Rejecting (or Forwarding) on no Response - If the subscriber fails to respond within a certain period time after the dialog box has been displayed, the incoming call can be either rejected or handled based on the treatment pre-defined by the subscriber.

- o Automatic Incoming Call Disposition - Incoming calls are automatically handled based on dispositions pre-defined by the subscriber without his or her real-time intervention. The subscriber can pre-define the default disposition (e.g., re-directed to voice mail) for general calls as well as customized dispositions for calls from specific numbers. In the latter case, the subscriber selects a particular disposition for each originating number and stores this information in a profile. When

a call comes in, the subscriber won't be presented the call but can examine the treatment and outcome of the call from the caller log (as described in the call logging bullet). Naturally, this feature also allows the subscriber to specify the desired treatment for calls originating from private or unpublished numbers.

o Multiple Call Handling - Multiple calls can arrive during call disposition processing. With multiple call handling, the subscriber is notified of the multiple calls one by one.

o Call Logging - A detailed log of the incoming calls processed during the ICW service is kept. Typical information recorded in the log include the incoming call date and time, calling party number, calling party name, and call disposition.

3. Korea Telecom's ICW Implementation

3.1. Overview

Korea Telecom's ICW implementation supports most of the features described in Section 2. (The major exception is the feature of receiving the incoming call over the Internet using voice over IP.) In addition, the Korea Telecom implementation supports flexible activation and de-activation of the ICW service:

o Automatic Activation/De-activation - When Internet dial-up connection is set up, the ICW service is activated or de-activated automatically.

o Manual Activation/De-activation - The subscriber can de-activate the ICW service manually when call notification is not desired during the Internet dial-up session and activate it when needed.

3.2. Network Architecture

Figure 1 depicts the network architecture of the Korea Telecom ICW service. The Service Switching Point (SSP), Service Control Point (SCP), and Intelligent Peripheral (IP) are legacy PSTN IN elements based on IN CS-1. In contrast, both the ICW Server System and the ICW Client System are new network elements that are installed in the Internet domain to support of the ICW service.

```
+----------------------------+         |      +---------------+
|+--------+propr-+----------+| PINT    |      |(Proxy Server) |  PINT
||(ICW SL)|ietary|(UAC/UAS) ||--- -||-----|      ICW      |----+
||SCF/SDF |------|  SCGF    ||  firewall  |Server System  |    |
|+--------+ i/f  +----------+|         |      +---------------+    |
|          SCP               |         |                           |
+-------+-------------+-----+          |                           |
        |INAP          |INAP           |           firewall=====
        |              |               |                           |
```

```
     +---+---+      +---+---+                             |
     | IP    |      |  SSP  |                             |
     +-------+      +---+---+                      +-------------+
                        |                  +---+   |  (UAC/UAS)  |
                    +---+---+             ||   ||  |     ICW     |
          |---------|  LEX  |--------------  + +   |Client System|
       +---+        +-------+              +++++----+-------------+
       ||   ||                            (callee)
         + +                   ICW Subscriber's Phone and PC
       +++++
     (caller)

             INAP : Intelligent Network Application Protocol
             PINT : PSTN/Internet Interworking Protocol
             SL   : Service Logic
             UAS  : User Agent Server
             UAC  : User Agent Client
```

Figure 1: Network Architecture of the Korea Telecom ICW Service

3.3. Network Entities

3.3.1. SSP

The SSP performs the Service Switching Function (SSF) and Call Control Function (CCF). When detecting that the called party is busy (T_Busy), the SSP sends a query to the SCP and processes the call under the control of the SCP.

3.3.2. SCP

The SCP performs the Service Control Function (SCF) and Service Data Function (SDF). It, when queried, instructs the SSP to process the call based on the service logic. In the case of the ICW service, the service logic ultimately governs the notification of a waiting call to an online ICW subscriber and the disposition of the call. In addition, the SCP performs the Service Control Gateway Function (SCGF) for protocol inter-working between the PSTN/IN and Internet. It translates the SIP message from the ICW Server to the service control interface message and vise versa. The SCGF is an IP end point and behaves as a UAS (User Agent server) or UAC (User Agent client).

3.3.3. IP

The IP contains Service Resource Function (SRF). It, when necessary, plays announcements to the calling party during the ICW service before/after receiving the response from the ICW subscriber and records the calling party number or voice message from the calling party when the call is forwarded to the Voice Mail System (VMS).

3.3.4. ICW Server System

The ICW Server system serves as a SIP proxy or a redirect server for message routing between the ICW Client and SCGF. The ICW Server is also responsible for managing the ICW Clients that are connected to it. When an ICW Client (subscriber) sends a registration request for the ICW service, the ICW Server relays that request to the SCP, waits for the result of authorization from the SCP, and registers the authorized subscriber in its data base. In addition, the ICW Server monitors the connection status of the registered ICW Clients. As soon as a client deactivates the ICW service or terminates the Internet connection, the ICW Server detects the status change and deactivates the ICW service for the client. Finally, the ICW Server manages profiles for each ICW subscribers as well as logs all the call processing results.

3.3.5. ICW Client System

The ICW Client System is an application program running on the subscriber's PC. Launched as soon as the subscriber powers on the PC, it monitors the Internet connection status of the PC (or subscriber). Upon the subscriber's connection to the Internet, the ICW Client sends a REGISTRATION request to the SCGF via the ICW Server and then eventually to the SCP. In this capacity, the ICW Client acts as a UAC to the SCGF, which acts as a UAS. Thereafter it notifies the ICW Server periodically of the connection status of the subscriber.

The ICW Client is also responsible for popping up a dialog box on the subscriber's PC to announce an incoming call. The dialog box displays the number and name of calling party, calling time, and the call processing options (including Accept, Reject, Forward to another number or VMS). After the subscriber selects the option, the ICW Client sends it to the SCP. In this capacity, the ICW Client acts as a UAS.

Depending on the pre-defined ICW Service Profile, the ICW Client may screen the incoming call before notifying the subscriber.

The ICW Client manages the ICW Service Profile, which contains the following fields:

- o Subscriber Information (including, Name, Directory Number, Password)

- o Service Status (Activation/De-activation)

- o Automatic Call Processing Method

  + Call Processing Method on No Answer (Reject/Forward/VMS) - The call is automatically handled by the method if the subscriber doesn't respond after a pre-defined period of time.

  + Do Not Disturb Mode (On/Off) - When this is set on, the subscriber

won't be notified of the incoming calls.

+ Call Processing Method on Do Not Disturb (Reject/Forward/VMS)

+ Call Processing List by Calling Party Numbers (Accept/Reject/Forward/VMS) - Calls originated from a number on the list are handled by the associated call processing method.

o The ICW Client records the call processing method and the result for each incoming call in a log file on the subscriber's PC. The

call record in the call log contains the following information:

- Calling Time
- Calling Party Number
- Calling Party Name (optional)
- Call Processing Method (Accept/Reject/Forward/Forward to VMS)
- Result (Success/Fail)

3.3.6. Firewall

Packet Filtering Firewall Systems are between the ICW server and clients as well as between the SCGF and ICW server for accessing the Korea Telecom IN Nodes.

3.4. Network Interfaces

o The SCF-SDF, SCF-SSF, and SCF-SRF interfaces are the same as existing PSTN IN Interfaces based on the KT INAP CS-1.

o The SCGF-SCF interface relays requests either from the IN or the Internet and is implemented based on the internal API of the SCP.

o The SCGF-ICW Server and ICW Server-ICW Client interfaces are implemented based on the PINT Service Protocol V.1. We adopted UAS-Proxy-UAC relationships as shown in Figure 2.

```
+---------+           +-------------+           +---------+
|(UAC/UAS)|PINT 1.0|    (Proxy)    |PINT 1.0|(UAC/UAS)|
|         |--------|      ICW      |--------|   ICW   |
|  SCGF   |        |     Server    |        | Client  |
+---------+           +-------------+           +---------+
```

Figure 2: PINT Protocol Architecture

3.5. Protocols

3.5.1. Intelligent Network Application Part Protocol (INAP)

The SCP, SSP, and IP support the KT INAP V1.0, which is based on ITU-T INAP CS-1 with the incorporation of two INAP CS-2 messages [PRM (PromptAndReceiveMessage) and EM (EraseMessage)] for recording the voice message.

3.5.2. PINT Protocol

The ICW service uses the PINT Service Protocol 1.0 [1] for communications between the SCP and the ICW Server System, and between the ICW Server System and the ICW Client System. Developed in the

IETF PINT Working Group for invoking telephone services from an IP network, the PINT Service Protocol 1.0 specifies a set of enhancements to SIP 2.0 and SDP.

Summarized below are the elements of the PINT Service Protocol 1.0 relevant to the Korea Telecom ICW implementation:

o REGISTER

The REGISTER method is used to inform the SCP of the connection status of an ICW subscriber. With this method, the ICW Client sends to the ICW Server the IP address (of the PC) and phone number of the subscriber when the subscriber is first connected to the Internet. The ICW server relays the information to the SCP, which updates the data base (if the subscriber is authorized), and in the end sends a registration acknowledgment to the ICW Server and then the Client. After the subscriber is connected to the Internet, the ICW Client sends a REGISTER request to the ICW Server periodically at a pre-defined interval (e.g., 20 seconds) to indicate its connection status. The request is not relayed to the SCP. The ICW Server only checks if it is from the authorized subscriber. Finally, when the subscriber terminates the Internet connection, the Client sends the last REGISTER request to the SCP via the ICW Server. If the REGISTER request does not arrive during the pre-defined interval, the ICW Server can also detect the change of the connection status of the ICW Client.

o INVITE

The SCP uses the INVITE method to notify the ICW Client, via the ICW Server, of an incoming call.

o ACK

Both the SCP and the ICW Server use the ACK method to confirm the receipt of the final responses to their requests.

o BYE

The BYE method terminates a service session. In addition to this original usage, we use the value (success or failure) of the Subject header to indicate the result of the desired disposition of an incoming call in the PSTN.

o CANCEL

When the calling party releases the call before the called party responds, the SCP sends a CANCEL request to the ICW Client to cancel the INVITE request that it sent previously.

o OPTION

This method is not used in the KT implementation.

o Responses

The SCP responds to a REGISTER request with one of the status codes and associated comments below:

. 100 Trying: Trying
. 200 OK: Registered

The ICW Client responds to an INVITE request with one of the status codes and associated comments below:

. 100 Trying: Trying
. 200 OK: Accept the Call
. 303 see other: Forward the Call to Another Number
. 380 alternative service: Forward the Call to the VMS
. 603 decline: Reject the Call

3.6. Example Scenarios

3.6.1. ICW Service Subscription

Access to the Korea Telecom ICW service is by subscription. Here Korea Telecom serves as both the PSTN operator and IN-based ICW service provider. Note that the subscription data need to be loaded onto the relevant SSPs, including the local ones that may not be operated by Korea Telecom.

3.6.2. ICW Client Installation

An ICW subscriber should install the ICW Client program in his or her PC. The ICW Client is automatically activated to run as a daemon process when the subscriber's PC is turned on. The Client monitors the Internet connection status of the subscriber.

3.6.3. ICW Service Activation

When the subscriber initiates the Internet connection or activates the ICW service manually, the ICW service is activated. That is done by sending a REGISTER request with the directory number and IP address from the ICW Client to the SCP through the ICW Server.

```
ICW Subscriber ICW Server    SCGF         SCF/SDF      SSF/CCF    Calling
ICW Client                                                          party
 (DN1/IP1)       (IP2)        (IP3)                                 (DN2)
     |             |            |            |            |            |
    0A             |            |            |            |            |
    0BREG(DN1,IP1) |            |            |            |            |
 1   |------------>|REG(DN1,IP1)|            |            |            |
 2   |             |----------->|            |            |            |
     |             |           2A            |            |            |
     |             |            |reg(DN1,IP1)|            |            |
 3   |             |            |-.-.-.-.-.->|            |            |
     |             |            |           3A            |            |
     |             |            |   reg ok  3B            |            |
 4   |             |            |<-.-.-.-.-.-|            |            |
     |             |   200 OK  4A            |            |            |
 5   |             |<-----------|            |            |            |
     |    200 OK  5A            |            |            |            |
 6   |<------------|            |            |            |            |
    6A             |            |            |            |            |
     |             |            |            |            |            |

    -----> PINT Protocol            -.-.-> SCP Internal API
    --.--> INAP Protocol            +++++> ISUP Protocol
    =====> Bearer
```

Figure 3: ICW Service Activation

As depicted in Figure 3, the relevant information flows are as follows:

(0A) The ICW subscriber dials the ISP access number and establishes a PPP connection.

(0B) The ICW Client detects the PPP connection.

1. The ICW Client sends a registration request to the ICW Server in order to register the IP address-DN relationship for the dial-up connection.

2. The ICW Server relays registration request to the SCGF.

2A. The SCGF translates the user registration information from the SIP message to the SCP internal API message.

3. The SCGF relays the user registration message to the SCF/SDF.

3A. The SCF/SDF authorizes the subscriber with the directory number

based on the user registration information.

3B. The SCF/SDF stores the IP address of the ICW Client and sets the status to "Internet on-line."

4. The SCF/SDF sends the result of registration to the SCF/SCGF.

4A. The SCGF translates the user registration response of the SCP internal API message to the PINT message.

5. The SCGF relays the user registration response to the ICW Server.

5A. The ICW Server records the user registration information and the Internet on-line status for the subscriber in the data base.

6. The ICW Server sends the user registration response to the ICW Client.

6A. The ICW Client notifies the subscriber that the registration is completed successfully and the ICW service is in the active state.

3.5.4. Incoming Call Notification

When a calling party makes a call to the ICW subscriber, the SCP notifies the ICW Client of the incoming call and waits for the subscriber's response.

```
ICW Subscriber ICW Server    SCGF       SCF/SDF      SSF/CCF     Calling
ICW Client                                                        party
 (DN1/IP1)       (IP2)       (IP3)                                (DN2)
     |             |           |            |            |            |
     |             |           |            |            |setup(DN1,DN2)|
  1  |             |           |            |            |<+++++++++++|
```

```
      |            |            |            |           1A            |
      |            |            |          IDP(T-busy,DN1)|            |
  2   |            |            |            |<--.--.--.--|            |
      |            |            |           2A            |            |
      |            |            |           2B            |            |
      |            |            |           2C            |            |
      |            |       noti(DN1,IP1,DN2) |            |            |
  3   |            |            |<-.-.-.-.-.-|            |            |
      |            |           3A            |            |            |
      |        INV(DN1,IP1,DN2) |            |            |            |
  4   |            |<-----------|            |            |            |
      |           4A            |            |            |            |
      |            | 100 Trying |            |            |            |
  5   |            |----------->|            |            |            |
  INV(DN1,IP1,DN2) |            |            |            |            |
  6   |<-----------|            |            |            |            |
    6A             |            |            |            |            |
      | 100 Trying |            |            |            |            |
  7   |----------->|            |            |            |            |
      |            |            |            |            |            |

        -----> PINT Protocol              -.-.-> SCP Internal API
        --.--> INAP Protocol              +++++> ISUP Protocol
        =====> Bearer
```

Figure 4: Incoming Call Notification

As depicted in Figure 4, the relevant information flows are as follows:

1. The calling party at DN2 (a telephone user) makes a call to the ICW subscriber (PC user) at DN1. The connection is set up using the existing ISDN signaling.

1A. The SSF/CCF detects that the callee (the ICW subscriber) is busy.

2. The SSF/CCF sends InitialDP (T_Busy) to the SCF/SDF.

2A. The SCF/SDF determines whether the user at DN1 is PSTN on-line or Internet on-line. (The SCF/SDF executes the KT Telephone Mail Service logic in the PSTN on-line case and the ICW service Logic in the Internet on-line case.)

2B. The SCF/SDF retrieves the IP address corresponding to DN1.

2C. The SCF/SDF may play an announcement to the calling party, while waiting for the response of the called party.

3. The SCF sends an incoming call notification to the SCGF.

3A. The SCGF translates the incoming call notification from the SCP internal format to the PINT format.

4. The SCGF relays the notification to the ICW Server.

4A. The ICW Server double-checks the subscriber's status using the ICW subscribers profile in its own data base.

5. The ICW Server sends trying message to the SCGF.

6. The ICW Server relays the notification to the ICW Client.

6A. The ICW Client consults the ICW service profile to see if there is a pre-defined call disposition for the incoming call. If so, then the procedure for automatic call processing is performed.

6B. If there is no pre-defined call disposition for the incoming call, the subscriber is notified of the call via a pop-up dialog box.

7. The ICW Client sends trying message to the ICW Server.

3.6.5. Incoming Call Processing

The incoming call can be accepted, rejected, forwarded to another number, or forwarded to the VMS depending on the on-the-fly or pre-defined choice of the subscriber. This section describes the information flows for the cases of "Accept the call" and "Forward the call to another number."

3.5.5.1. Accept the Call

```
ICW Subscriber ICW Server    SCGF        SCF/SDF      SSF/CCF     Calling
ICW Client                                                          party
 (DN1/IP1)       (IP2)       (IP3)                                  (DN2)
     |             |           |            |            |            |
   0A   200 OK     |           |            |            |            |
 1   |------------>|           |            |            |            |
   1A              |           |            |            |            |
   1B              |  200 OK   |            |            |            |
 2   |             |---------->|            |            |            |
     |             |   ACK   2A             |            |            |
 3   |             |<----------|            |            |            |
     |             |           |Accept(DN1,IP1,DN2)      |            |
 4   |             |           |-.-.-.-.-.->|            |            |
     |             |           |            |Connect(DN1,DN2)         |
 5   |             |           |            |--.--.--.-->|            |
     |             |           |         Setup(DN1,DN2)  |            |
 6   |<++++++++++++++++++++++++++++++++++++++++++++++++++|            |
     |<===========================6A=============================>|
     |             |           |            |    ERB     |            |
 7   |             |           |            |<--.--.--.--|            |
     |             |           |     ok     |            |            |
 8   |             |           |<-.-.-.-.-.-|            |            |
```

```
     |          |         8A            |          |          |
     |          |     BYE   |           |          |          |
 9   |          |<----------|           |          |          |
     |         9A           |           |          |          |
     |          |           |           |          |          |


      -----> PINT Protocol              -.-.-> SCP Internal API
      --.--> INAP Protocol              +++++> ISUP Protocol
      =====> Bearer
```

Figure 5: Incoming Call Processing - Accept the Call

As depicted in Figure 5, the relevant information flows are as follows:

0A. The ICW subscriber chooses to "Accept" the incoming call.

1. The ICW Client sends the "Accept" indication to the ICW Server.

1A. The ICW Client records the subscriber's selection for the incoming call in the call log.

1B. The ICW Client terminates the subscriber's Internet connection.

2. The ICW Server sends an "Accept" message to the SCGF.

2A. The SCGF translates the "Accept" message to an SCP internal API message.

3. The SCGF sends an "ACK" message to the ICW Server.

4. The SCGF sends the "Accept" message to the SCF.

5. The SCF instructs the SSF/CCF to route the call to DN1.

6. The SSF/CCF initiates the connection setup to DN1.

6A. The bearer connection between the calling party (DN2) and the ICW subscriber(DN1) is set up.

7. The connection result is returned to the SCF through ERB.

8. The SCF sends a call completion message to the SCGF.

8A. The SCGF translates the call completion message to a PINT message.

9. The SCGF sends a "BYE" message to the ICW Server.

9A. The ICW Server records the call completion result in the log file.

□

3.5.5.2. Forward the Call to Another Number

```
ICW Subscriber ICW Server SCGF     SCF/SDF    SSF/CCF    Calling Another
ICW Client                                                party   Phone
 (DN1/IP1)     (IP2)      (IP3)                           (DN2)    (DN3)
     |          |          |          |          |          |         |
    0A          |          |          |          |          |         |
     |303 SeeOther         |          |          |          |         |
  1  |--------->|          |          |          |          |         |
    1A    ACK   |          |          |          |          |         |
  2  |<---------|303 SeeOther         |          |          |         |
  3  |          |--------->|          |          |          |         |
     |          |    ACK  3A          |          |          |         |
  4  |          |<---------|Connect(DN2,DN3)     |          |         |
  5  |          |          |-.-.-.-.->|          |          |         |
     |          |          |          |Connect(DN2,DN3)     |         |
  6  |          |          |          |.--.--.-->|          |         |
     |          |          |          |          |Setup(DN2,DN3)      |
  7  |          |          |          |          ++++++++++++++++++++>|
  8  |          |          |          |   ERB    |          |<===5A==>|
     |          |          |          |<--.--.--.|          |         |
     |          |          |    ok    |          |          |         |
  9  |          |          |<-.-.-.-.-|          |          |         |
     |          |   BYE    9A         |          |          |         |
 10  |          |<---------|          |          |          |         |
     |  BYE    10A         |          |          |          |         |
 11  |<---------|          |          |          |          |         |
    11A         |          |          |          |          |         |
     |          |          |          |          |          |         |

       -----> PINT Protocol                 -.-.-> SCP Internal API
       --.--> INAP Protocol                 +++++> ISUP Protocol
       =====> Bearer

  Figure 6: Incoming Call Processing - Forward the Call to Another
```

As depicted in Figure 6, the relevant information flows are as follows:

0A. The ICW subscriber chooses to "Forward to another number (DN3)" for the incoming call.

1. The ICW Client sends the "Forward to another number" indication to the ICW Server.

1A. The ICW Client records the subscriber's selection for the incoming call in the call log.

2. The ICW Server sends an "ACK" message to the ICW Client.

3. The ICW Server relays the "Forward to another number" message to the SCGF.

3A. The SCGF translates the "Forward to another number" message to an SCP internal API message.

4. The SCGF sends an "ACK" message to the ICW Server.

5. The SCGF sends the "Forward to another number" message to the SCF.

6. The SCF instructs the SSF/CCF to route the call to DN3.

7. The SSF/CCF initiates the connection setup to DN3.

7A. The bearer connection between the calling party (DN2) and the new termination number (DN3) is set up.

8. The connection result is returned to the SCF through ERB.

9. The SCF sends a call completion message to the SCGF.

9A. The SCGF translates the call completion message to a PINT message.

10. The SCGF sends the call completion message to the ICW Server.

10A. The ICW Server records the call completion result in the log file.

11. The ICW Server sends the success of "Forwarding to another number" to the ICW Client.

11A. The ICW Client records the call completion result in the log file.

3.6.6. ICW service De-activation

The SCP de-activates the ICW service for a subscriber either upon the termination of the subscriber's Internet connection or upon the subscriber's manual request. In this section, we illustrate the former scenario.

```
ICW Subscriber ICW Server    SCGF         SCF/SDF      SSF/CCF     Calling
ICW Client                                                           party
 (DN1/IP1)       (IP2)       (IP3)                                   (DN2)
    |              |           |            |            |            |
   0A              |           |            |            |            |
    |             0B           |            |            |            |
    |              |Unreg(DN1,IP1)          |            |            |
 1  |              |----------->|           |            |            |
    |              |          1A            |            |            |
    |              |           |Unreg(DN1,IP1)           |            |
 2  |              |           |-.-.-.-.-.->|            |            |
    |              |           |           2A            |            |
    |              |           |      ok   2B            |            |
 3  |              |           |<-.-.-.-.-.-|            |            |
    |              |          3A            |            |            |
    |              |   200 OK  |            |            |            |
 4  |              |<----------|            |            |            |
    |             4A           |            |            |            |
    |              |           |            |            |            |

       -----> PINT Protocol              -.-.-> SCP Internal API
       --.--> INAP Protocol              +++++> ISUP Protocol
       =====> Bearer
```

Figure 7: ICW Service De-activation

As depicted in Figure 7, the relevant information flows are as follows:

0A. The ICW subscriber terminates the Internet connection.

0B. The ICW Server determines that the Internet connection has been terminated when it does not receive the periodic on-line notification from the ICW Client.

1. The ICW Server sends an un-register message to the SCGF.

1A. The SCGF translates the un-register message to an SCP internal API message.

2. The SCGF sends the un-register message to the SCF.

2A. The SCF/SDF authorizes the subscriber with the directory number based on the un-registration information.

2B. The SCF/SDF records the Internet off-line status for that ICW Client.

3. The SCF/SDF sends a user un-registration response to the SCF/SCGF.

3B. The SCGF translates the user un-registration response to a PINT message.

4. The SCGF relays the user un-registration response to the ICW Server.

4A. The ICW Server records the Internet off-line status for the ICW Client (subscriber) in the data base.

4. The Lucent Technologies Online Communications Center

4.1 Overview

The Lucent Technologies Online Communications Center (OCC) is an Intelligent Network (IN)-based platform that supports the Internet call waiting service. Its basic components are the OCC Server and OCC Client, which are described in detail in the Architecture section. The OCC Server interacts with the PSTN entities over the secure intranet via plain-text Session Initiation Protocol (SIP) messages [2]. With the PC Client, the OCC Server interacts via encrypted SIP messages.

The OCC Server run-time environment effectively consists of two multi-threaded processes responsible for Call Registration and Call Notification services, respectively.

OCC call registration services are initiated from an end-user's PC (or Internet appliance). With those, a subscriber registers his or her end-points and activates the notification services. (The registration services are not, strictly speaking, SPIRITS services but rather have a flavor of PINT services.)

All OCC call notification services are PSTN-initiated. One common feature of these services is that of informing the user of the incoming telephone call via the Internet, without having any effect on the line already used by the modem. (A typical call waiting tone would interrupt the Internet connection, and it is a standard practice to disable the "old" PSTN call waiting service for the

duration of the call in support of the Internet connection between the end-user and the ISP.)

When a call comes in, the user is presented with a pop-up dialog box, which displays the caller's number (if available), name (again, if available), as well as the time of the call. If the called party does not initiate an action within a specified period of time the call is rejected.

As far as the disposition of the call is concerned, OCC supports all the features described in Section 2.

4.2. Architecture

```
             +------------+
             | Compact    |
             | Service    |          +-------------+
     +-----| Node (CSN) |          | Service     |
     |     | OCC Server |          | Management  |
     |     | OCC CSN SPA|          | System (SMS)|
     |     +-------:--|-+          +-------------+
     |             |  +-------------[ IP INTRANET ]---------+
  ===== firewall   :                                        |
     |             |                                        |
     |         +-------+                                +-------+
     |         |Central|-..-..-..-..-..-..-..-..-..-..-..|Service|
     |      +-%-|Office |-..-..-:                       |Control|
     |      |  +---|---+        |                       |Point  |
     |      %      |            :                       | (SCP) |
     |      |   +--|---+   +-------+     +----------+   |OCC SCP|
     |      %   | PC   |   | VoIP  |     | VoIP     |   |  SPA  |
     |      |   |OCC Cl|   |Gateway|     |Gatekeeper|   +-------+
     |      %   +------+   +---|---+     +-----|----+
     |      |               ===== firewall =====
     |      %                  |               |
     |      |   +--------------|---+           |
     |      +-%-|                  |-----------+
     +----------|  I N T E R N E T |
                |                  |
                +------------------+
```

Figure 8: The Lucent OCC Physical Architecture

Figure 8 depicts the joint PSTN/Internet physical architecture relevant to the OCC operation. The Compact Service Node (CSN) and SCP are Lucent's implementations of the ITU-T IN Recommendations (in particular, the Recommendation Q.1205 where these entities are defined) augmented by the requirements of Bellcore's Advanced

Intelligent Network (AIN) Release 1.0) and equipped with other features. The Central Office (CO) may be any switch supporting the Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) and the call forwarding feature that would allow it to

interwork with the CSN. Alternatively, in order to interwork with the SCP, it needs to be an IN Service Switching Point (SSP). In the latter case, the central office is connected to the SCP via the signaling system No. 7 (SS7) and INAP at the application layer.

The Service Management System (SMS) is responsible for provisioning of the SCPs, CSNs, and central offices. In particular, for IN support of the Internet Call Waiting, it must provision the Central Office to direct a terminating attempt query to the subsystem number corresponding to the OCC SCP SPA based on the Termination Attempt Trigger (TAT). In addition, the Subscriber Directory Number (DN), Personal Identification Number (PIN) and Language ID are provisioned for each subscriber into the OCC Subscriber entry of the SCP Real Time Data Base (RTDB). Figure 9 shows the structure of an RTDB entry.

```
+-------------------------------------------------------+
|DN | PIN | IP Address | Session Key | CNF | Language ID|
+-------------------------------------------------------+
```

Field Descriptions:

(DN) Directory Number - the subscriber's telephone number

(PIN) Personal Identification Number - the subscriber's password

IP Address - Internet Protocol Address of the subscriber

(CNF) Call Notification In Progress Flag (boolean) - the flag indicating if an attempt to notify the subscriber of a call is currently in progress

Session Key - unique identifier for the current registration session of the subscriber

Language ID - language identifier for the subscriber

Figure 9: Structure of the RTDB Subscriber Record

The Central Office, SMS, CSN, and SCP are the only PSTN elements of the architecture. The other elements are VoIP Gateway and Gatekeeper defined in the ITU-T Recommendation H.323, whose roles are to establish and provide the part of the voice path over IP. The Central Office is explicitly connected to the VoIP Gateway via the

ISDN PRI connection. In this architecture, CSN, VoIP Gateway, and VoIP Gatekeeper are the only entities connected to the Internet, with each respective connection protected by a firewall. The CSN and SCP are interconnected via a secure IP Intranet. There may be more than one CSN or SCP (or both) (and the SCPs come in mated pairs interconnected by X.25, anyway) in a network, but these details are not essential to the level of description chosen for this document. However, we note that load balancing and adaptation to failures by the use of alternative nodes is incorporated into the architecture.

When someone attempts to call the subscriber, the central office serving that subscriber interrupts normal termination processing and notifies the SCP which, in turn, can check whether that subscriber has registered that he (or she) is logged onto the Internet. Exploiting the standardized layering of service logic that characterizes the intelligent network, the central office will do this without requiring the installation or development of any central office software specific to OCC. The central office is simply provisioned to query the SCP when there is a termination attempt (i.e., TAT) directed to the subscriber's directory number. (Note that the Central Office has no bearer circuit connection to the SCP, only a signaling one over SS7).

TCP/IP communication between the SCP and CSN utilizes a secure intranet. The subscriber, of course, is assumed to have access only to the Internet.

The intelligent network entities, the SCP and CSN, do have OCC related software. The OCC server is implemented on the CSN. In addition, one service package application (SPA) is installed on the SCP. Another SPA is located in the CSN and is needed only when the subscriber elects to accept an incoming call using voice over IP.

The OCC Server is a collection of Java servers on the CSN whose responsibilities include:

o Listening for incoming Call Notification (TCP/IP) messages from the SCP SPA.

o De-multiplexing/multiplexing incoming Call Notification messages sent from the SCP SPA.

o Relaying messages between the OCC Client and the SCP SPA.

o Listening for and authentication of OCC Client requests for service registration.

o Handling encryption/decryption of messages exchanged with the OCC Client, and generating session-specific encryption/decryption keys.

The OCC Client is a collection of software components that run on the Subscriber's PC. Its components include the SIP User Agent Server (which handles the exchange of SIP messages with the OCC Server and invokes the Call Notification pop-up window) and a daemon process that monitors the Point-to-Point Protocol (PPP) actions and is responsible for starting and stopping the SIP User Agent Server.

4.3. Protocol and Operations Considerations

The OCC Server uses distinct TCP/IP ports configured on the CSN to

o Listen for incoming SIP REGISTER messages (in support of

registration service) sent from the OCC Client.

o Listen for incoming SIP INVITE messages (in support of call notification service) sent from the SCP.

During call notification, the SCP SPA is the client and thus is started after the OCC Server has been started. The SCP SPA and OCC Server exchange SIP messages over TCP/IP (via the Secure Intranet) using a "nailed-up" connection which is initiated by the SCP SPA. This connection is initiated at the time the SCP SPA receives the very first SIP REGISTER request from the OCC Server, and must prevail for as long as the SPA is in the in-service state. The SCP SPA also supports restarting the connection after any failure condition.

The OCC Server supports multithreading. For each Call Notification/Call Disposition event, a separate thread is used to handle the call. This model supports multi-threading on a "per message" basis where every start message (SIP INVITE) received from the SCP SPA uses a separate thread of control to handle the call. Subsequent messages containing the same session Call-ID (which includes the SPA's instance known as "call_index" and the SCP hostname) as the original start message is routed to the same thread that previously handled the respective initiating message.

The OCC Server dynamically opens a new TCP/IP socket with the OCC Client for each Call Notification/Call Disposition session. This socket connection uses the IP address and a pre-configured port on the PC running the OCC Client software.

For session registration, the OCC Server dynamically opens TCP/IP sessions with the SCP SPA. The SCP SPA listens at a pre-configured port to incoming SIP REGISTER messages sent by OCC Clients via the

OCC Server. To exchange SIP messages with the OCC Server, the OCC Client dynamically opens a TCP/IP socket connection with the OCC Server using a pre-configured port number on the CSN and the CSN's IP address.

For the VoIP Scenario, the CSN SPA, acting as a client, dynamically opens TCP/IP sessions with the SCP that handled the initial TAT query. As soon as the CSN SPA has successfully made the correlation and connected the two incoming call legs pertaining to a VoIP call back, the SIP 180 RINGING message will be sent back to the SCP SPA running on the actual SCP that instructed the SSP to forward the Caller to the CSN. This SIP message, which contains the VoIP Call Back DN dialed by one of the bridged call legs, is an indication to the SCP SPA that the VoIP Call Back DN is freed up.

A typical subscription scenario works like as follows:

1. Each VoIP Gateway is provisioned with a list of authorized VoIP Call Back DNs, each terminating on a particular CSN. These special DNs are used when an on-line subscriber elects to receive an incoming call via VoIP. In particular, they assist in routing an outgoing call from the subscriber's NetMeeting to the

particular CSN to which the SCP is (roughly concurrently) forwarding the incoming call. (These two calls are joined in the CSN to connect the incoming call to the subscriber's Netmeeting client.) Furthermore, these special DNs permits that CSN to associate, and hence bridge, the correct pair of call legs to join the party calling the subscriber to the call from the subscriber's NetMeeting client.

2. The subscriber calls a PSTN service provider and signs up for the service.

3. An active Terminating Attempt Trigger (TAT) is assigned to the subscriber's DN at the subscriber's central office.

4. The PSTN service provider uses the SMS to create a record for the subscriber and provision the Subscriber DN and PIN in the OCC RTDB table in the SCP.

5. The subscriber is provided with the OCC Client software, a PIN and a file containing the OCC Server IP Addresses.

Finally, we describe the particular scenario of the OCC Call Disposition that involves voice over IP, which proceeds as follows:

1. The OCC subscriber clicks on "Accept VoIP".

2. The OCC Client sends a "SIP 380 Alternative Service" message to the OCC Server. This message includes a reference to the Call Back DN which will ultimately be used by the CSN to associate the call leg (soon to be initiated by the subscriber's NetMeeting) connecting to the subscriber (via the VoIP gateway) with the PSTN call leg connecting to the calling party.

3. The OCC Server closes the TCP/IP session with the OCC Client and sends to the SCP SPA the "SIP 380 Alternative Service" message which includes the Call Back DN.

4. The SCP SPA instructs the Central Office to forward the call incoming to the subscriber to the CSN. This instruction includes the Call Back DN.

5. The SSP forwards the Caller to the CSN referencing the Call Back DN. Note that the Call Back DN, originally assigned to the OCC client by the SCP when the subscriber was alerted to the presence of an incoming call attempt, flowed next to the OCC server when the client elected to receive the call via VoIP, then to the SCP, then to the central office in association with a SCP command to forward the incoming call to the CSN, then to the OCC server on the CSN in association with that forwarded call.

6. Meanwhile, the OCC Client extracts 1) the VoIP Call Back DN from the SIP INVITE message received during Call Notification and 2) the H323UID and H323PIN values from its properties file and updates the 'netmtg.cnf' file.

7. The NetMeeting application is launched and sets up a connection with the VoIP Gateway.

8. Once a connection is established between NetMeeting and the VoIP Gateway, NetMeeting initiates a phone call - passing to the VoIP Gateway the Call Back DN as the destination DN.

9. The VoIP Gateway consults the VoIP Gatekeeper and authenticates the NetMeeting call by verifying the H323UID and H323PIN values, and by ensuring the called DN (i.e., Call Back DN) is authorized for use.

10. After passing the authentication step, the VoIP Gateway dials (via PSTN) the Call Back DN and gets connected to the CSN. The CSN notes that it was reached by the particular Call Back DN.

11. The CSN bridges the Calling and Called parties together by matching on the basis of the Call Back DN.

12. The CSN notifies the SCP (SIP 180 Ringing) of status and references the Call Back DN so that the SCP can reuse it for other calls.

13. If the central office supports that two B-channel transfer (Lucent, Nortel, and perhaps other central office vender's do), an optimization is possible. The CSN can have the central office rearrange the topology of the newly connected call in such a way that it flows only through the central office and no longer through the CSN.

5. NEC's Implementation

5.1. Overview

The NEC implementation of the ICW service is based on IN. Via a SPIRITS server and an ICW client, incoming calls will be presented to the user via a pop-up screen dialogue box. This dialogue box informs the user of the call arrival time and the calling party's number and name (if available). The arrival of the call is also indicated with an accompanied audible indication.

The pop-up dialogue box offers the user various call management options. Selecting a call management option allows the user to answer the call, forward it to another destination or to voice mail, or ignore it.

The user will be able to customize their service through various service set-up options. All calls presented to the user during an Internet session will be recorded in a call log.

Other features include Multiple call arrival management with which each new call arrival will generate its own pop-up dialogue box and audible indication.

5.2. Architecture and Overall Call Flow

   Figure 10 depicts the NEC ICW system.

```
                    =====================================
                    ||          I n t e r n e t        ||
                    ||                                 ||
                    =====================================
                     /                      |        \
                    :  (p1)                 :        :  (p2)
                   /                        |         \
                +-------+              +------------+  +-----+
                |SPIRITS|              |    ISP     |  | W3S |
                |Server |              |    ISP     |  | W3S |
                +-------+              +------------+  +-----+
                    :                       :
    Internet        |                       :
    PSTN/IN         |(p0)                   :
                    :                       :
                    |        ============:======
                +------+ (p3) ||  +-----+ :     ||
                | SCP  |-..-..-..-| SSP | :     ||
                +------+      ||  +-----+ :     ||
                              ||  (p4)|   :     ||
    +-------+                 ||      :   :     ||
    | ICW   | (p1)+-----+     ||      |   :     ||
    |Client |.....| M/D |............+------+   ||
    +-------+ (p2)+-----+     ||     | CO   |   ||
                --------------------|      |-------
               /              ||     +------+   || \
      /--\    /               ||     P S T N    ||  \       /--\
     ()/\()  /                ||                ||   \     ()/\()
    _/__\___/                 ==================      \______/__\_

    ICW Subscriber                                  Calling Party
```

   Legend:
           ISP : Internet Service Provider
           W3S : WWW Server
           SCP : Service Control Point(acts as SPIRITS Client)

```
        SSP :  Service Switching Point
        CO :  Central Office
        M/D :  Modem

Traffic:
        --- : PSTN Voice Traffic
        ... : PPP(IP traffic)
        -..-: Signaling Traffic
```



```
Interfaces:
         p0 : SPIRITS Server-SCP(SPIRITS Client) interface
         p1 : SPIRITS Server-ICW Client interface
         p2 : ICW Client-W3S interface
              (Web access through HTTP)
         p3 : SCP-SSP interface(INAP)
         p4 : SSP-CO interface(ISUP)
```

Figure 10: the NEC ICW system

The description below provides the necessary steps to initiate the ICW service on a CO line, and how the ICW service is applied to an incoming call based on the above architecture:

1. The CO line is primed for the ICW service when the customer connects to their ISP by inserting a special activation code (e.g., *54) prefix in front of the ISP Directory Number.

2. The ICW service is activated when the user opens a secured session from an ICW client to the SPIRITS server. Once a session is open, the SPIRITS server will know the relationship between the line and the PC (i.e., it will know the Directory Number of the user's Internet line and the user's IP Address).

3. When a call arrives at a busy Internet line, the SSP will trigger the ICW service. The SCP which acts as the SPIRITS client will inform the SPIRITS server that a call is terminating to a busy Internet line. The message will include the Caller ID and Calling Line Identify Restriction (CLIR) Status of the calling party, and DN of the busy line.

4. The SPIRITS server will verify that if an ICW session has been established for the busy line. If so, the SPIRITS server will communicate with the user's ICW client application. The user will receive a real-time pop-up dialogue box including the Calling Name and Number of the Calling Party if available. The user will then select one of the following call management options:

   - Answer the call (the Internet connection will be automatically dropped and the phone will ring)
   - Send the call to Voice Mail
   - Forward the call to another destination
   - Ignore the call

5. When the Internet user has made a selection, the ICW client application will transmit this to the SPIRITS server. The SPIRITS

server will instruct the PSTN via the SCP how to handle the call.

5.3. Interfaces and Protocols

5.3.1. SCP (SPIRITS Client)-SPIRITS Server Interface

5.3.1.1. Connecting to SPIRITS Services

The physical connection between the SCP and the SPIRITS server will be via a LAN/WAN. The logical connection will use the UDP/IP communications as defined in RFC 768 and RFC 1122.

If a socket connection is not currently established, the SCP will periodically try to open a connection. The SCP routing tables will be configured so that all available connections to a SPIRITS server are used.

5.3.1.2. Message Types

Two different types of message are used between the SCP and the SPIRITS server: "Connection Management Message Type" and the "Data Message Type". These messages will carry the remote operation messages which are based on ITU-T Q.1228 SCF-SCF interface with some NEC proprietary extensions.

NEC also has a plan to support SIP/SDP-based protocols for the SPIR-ITS client-server interface in the near future.

5.3.1.2.1 Connection Management Message Type

Connection management messages are to support functions related to the opening and closing of connections and monitoring connections to ensure reliable communications are maintained between the SCP and a SPIRITS server. The SCP is responsible for establishing a connection to a SPIRITS server. A connection can be closed by either the SCP or the SPIRITS server.

The "Connection Management Message Type" includes the following operations:

- scfBind - scfUnbind - activitytest

Opening a Connection

If a connection is not open to an SPIRITS server, the SCP will periodically try to open a connection until it is opened. If after a pre-determined number of attempts the connection is not opened, the socket connection will be released and then re-established and then the attempt to open the connection will be repeated.

The sequence for opening a connection is:

1. SCP will transmit a scfBind invokation message to the SPIRITS server. This message also carries the version information and activity test interval.

2. The SPIRITS server, upon receiving an invokation of the scfBind from a particular SCP, will reset all the data concerning the connection and then responds with either a return result containing the Web Server Identification number or a return error with a reason.

3. When the SCP receives a return result, if the ID number does not match the number configured in the SCP, then a scfUnbind will be sent indicating the wrong ID number. If the SCP receives nothing or a return error is received, then the scfBind will be retried after a pre-determined period of time.

4. Once the SCP has received a return result, the SCP will send Handling Information Request or Activity Test.

Upon receiving an invokation of activityTest, the SPIRITS server should reply with a return result of activityTest. If the SPIRITS server does not receive any invokation messages of Handling Information Request or Activity Test from the SCP for four times the Activity Test Interval value in milliseconds, the SPIRITS server should then close the connection.

To close a connection an invokation of the scfUnbind is sent by either the SCP or SPIRITS server to the remote end. When an invokation message of the scfUnbind is received, the receiving end should terminate the connection.

scfBind

The scfBind operation is used to open the connection between the SCP and the SPIRITS server. The SCP will send the SPIRITS server an invokation of the scfBind to establish an association. If the SPIRITS server is ready to handle the request then it should respond with a return result.

The return result of scfBind contains the identifier of the SPIRITS server. If the SCP receives the return result where the identification of the SPIRITS server does not match that registered against the SPIRITS server, then the SCP will send an invokation of the scfUnbind indicating an incorrect identifier was received.

If the SPIRITS server is not ready to handle the request or cannot handle the version, then it should respond with a return error.

scfUnbind

The scfUnbind operation is used to close the connection between the SCP and the SPIRITS server. Either the SCP or the SPIRITS server can invoke this operation.

Upon receiving an invokation message the receiving end should terminate the connection.

activityTest

If the SCP has not sent a Data Message for the time period specified by the "Activity Test Interval", it will send an invokation message of activityTest. When the SPIRITS server receives such an invokation, it will reply with a return result message of activityTest.

Its contents should be retained by the SPIRITS server. They are to be echoed back in the return result so that the message reply time can be calculated.

5.3.1.2.2. Data Message Type

SCPs use the following operations, which are sent to the SPIRITS server via a Data-Message-Type message, to request execution of some service procedure or notification of an event that takes place at the SCPs:

o handlingInformationRequest

  The handlingInformationRequest message will request a SPIRITS server the execution of some service procedure.

o handlingInformationResult

  The handlingInformationResult message will show the SCP the result of the execution, which was carried out by the SPIRITS server.

o confirmedNotificationProvided

  The confirmedNotificationProvided message will indicate to the SPIRITS server of an event, which takes place at the SCP. If the confirmedNotificationProvided indicating 'caller abandon' is received, the SPIRITS server will inform the client of the caller abandon and send the SCP a return result for the confirmedNotificationProvided.

  The invoked operation has always a response which is either a return result of the operation or an invokation of another operation.

  If a Data Message is not replied to within a pre-determined time out period then the message will be resent a number of specified times. Once the number of times has been exceeded, if another node exists, the message will be sent to another node if it is

available. If all available SPIRITS servers have been queried then Message Time out will be returned to the calling process.

If an invokation of the handlingInformationResult is received with the cause=63 (Service not available), the handlingInformationRequest will be sent to another node if it is available. If all available SPIRITS severs have been queried then cause=63 will be returned to the calling process.

5.3.2. SPIRITS Server-ICW Client Application Interface

The following is a list of the application messages that are sent via the secure protocol (refer to section 5.3.3):

o VersionInfo (ICW client -> SPIRITS server)

Indicate the current version of ICW client software. The SPIRITS server uses this information to determine if the client software is out of date.

o VersionInfoAck (SPIRITS server -> ICW client)

If the VersionInfo message from an ICW client indicates to a SPIRITS server that it is an out of date version, the URL information is returned within the VersionInfoAck message for use in downloading the newer version. If the client software is up to date, the message simply indicates so and does not include any URL information.

o CallArrival (SPIRITS server -> ICW client)

Sent by the server to tell the client someone has called the DN.

o CallID

An identifier for this call. Unique in the domain of this client/server session.

o CallingNumber

o CallingName

The name of the calling party is sent to the Client Application from the SPIRITS server. When available, the name is sent as a 15-character string. If the name is unavailable it is sent as "Name Unavailable". If the calling party has CLIR set, it is sent as empty (" ").

o CallConnect (ICW client -> SPIRITS server)

If a corresponding CallConnect is not received within a certain period after sending a CallArrival, the SPIRITS server will behave

as though a CallConnect, Handling=Ignore had been received.

o CallLost (SPIRITS server -> ICW client)

Sent by server to cancel a CallArrival before a CallConnect is received by the server.

5.3.3. Secure Reliable Hybrid Datagram Session Protocol (SRHDSP) for Use Between ICW Client Application and SPIRITS Server

5.3.3.1. Overview

In principle the solution involves session initiation over SSL (meeting requirements for standards based security) after which the SSL session is closed, thereby reducing the number of simultaneous TCP/IP sessions. The rest of the session is communicated over UDP/IP, secured using keys and other parameters exchanged securely during the SSL session.

5.3.3.2. Session Initiation

The ICW client initiates an SRHDSP session, by reserving a UDP/IP port, and opening an SSL session with the service (e.g., ICW) on the service's well known SSL/TCP port. After establishing the SSL Session, the ICW client sends the server its IP address, the reserved UDP port number, and the set of supported symmetric key algorithms.

The server responds with a symmetric key algorithm chosen from the set, the server's UDP port for further communication, heartbeat period, and the value to use for the sequencing window.

The client then generates a symmetric key using the selected algorithm and transmits this to the server. The SSL session is then closed and the SRHDSP session is considered open.

5.3.3.3. Secure Reliable Datagram Transport

Application, and subsequent session management messages use symmetric signaling. That is, the signaling is the same whether the client is sending a message or the server is sending a message.

The message packets are transmitted securely. The protocol corrects for lost, duplicated and out of sequence packets.

5.3.3.4. Session closure

The client or server may close the session.

A session is closed using a Close message including the next sequence number, and encrypted with the agreed key.

The receiver, on processing (as opposed to receiving) a Close message, should set a timer, when the timer expires all details of the session should be forgotten. The timer is to allow for retransmission of the close if the Ack gets lost, we still need to be able to decrypt the subsequent retransmission and re-acknowledgment.

If any message other than a close is received after a close is processed, it is ignored.

6. Telia/Nortel's Implementation

6.1. Overview

The system implemented by Telia in cooperation with Nortel Networks is designed to support services that execute before the end-to-end media sessions are established. These services include, for example:

- call transfer and number portability for redirecting calls
- call waiting and call offering for announcing a pending call
- call screening and don't disturb for filtering incoming calls
- automatic call distribution and 800-services for selecting termination point

The Telia/Nortel system aims to allow service providers to develop the services mentioned above. Presently, prototypes for online incoming call disposition and automatic incoming call disposition (described in Section 2) have been developed to prove the concept.

In the Telia/Nortel architecture, services run on top of SIP Redirect Servers. The distributed nature of SIP enables these servers to be hosted, for example, by an enterprise server, a Service Provider's server cluster, a user's desktop PC, or even by a hand-held cordless device.

The SIP Redirect Server receives a SIP INVITE message for each call regardless of which network the call is being set up in. The server MAY apply any kind of service logic in order to decide on how to respond to the invitation. Service logic may interact with the user to allow the user to specify how to handle a call such as described in Section 2. This, however, is not the focus of the Telia/Nortel system.

6.2. Architecture and Protocols

The general idea behind the architecture is to create services as if all communication was based on IP and all clients and servers were SIP enabled. This of cause is not true in existing telecommunications networks. Hence, a new type of network element, the Service Control Gateways (SCG) hides the true situation from the services.

SCGs convert network-specific call control signaling to SIP messages and vice versa. A SCG behaves as a regular SIP User Agent (UA) towards the services and as a network-specific service control node

in the network where the call is being set up. For example, when connecting to a GSM network, the SCG can play the role of an SCP or a MAP or an ISUP proxy. The specific role depends on what service triggers are being used in the GSM network.

SCGs handle protocol conversions but not address translation, such as telephone number to SIP URL, which is handled by a regular SIP Server to keep the SCG as simple as possible.

Consider a service example of number portability. A conventional number portability implementation in a mobile Circuit Switched Network (CSN) uses INAP messages to carry number queries to a network-internal data base application. Here, a SCG and a high-performance SIP Redirect Server, referred to as the Number Server (NS), have replaced the data base typically located in an SCP. (See Figure 11.)


```
+-----------+  INAP  +-----+  SIP  +-------------------------+
|  CSN node |--------| SCG |-------| NS (SIP Redirect Server) |
+-----------+        +-----+       +-------------------------+
```

Figure 11: An Architecture for Number Portability

The INAP IDP message that carries the number query is converted to a SIP INVITE message by the SCG and is then forwarded to the NS (SIP Redirect Server).

If the called number is not registered, then the NS will return "404 Not Found". The SCG interprets this as "non ported number" and returns a CON message to the CSN network, making it connect the call to the called number.

If the number is ported and hence registered, then the NS will return "301 Moved Permanently" with a TEL URL (routing number) in the contact field. The SCG then returns a CON message to the CSN network, making it connect the call to the number that was conveyed in the contact field.

The solution above enables the same Number Server to provide Number Portability to multiple networks by means of using multiple SCGs.

If we make the SIP server in the number portability example operate in proxy mode for selected numbers, then it will become a kind of service router, able to relay number queries to any SIP-Redirect-Server-based service anywhere, provided there is an IP connection to the host in concern. Figure 12 shows the arrangement.

```
+------+ INAP +-----+ SIP +---------------+ SIP +----------+
|  CSN |------| SCG |-----|       NS      |-----| Service  |
```

```
   | node |       |     |     |(redirect/proxy)|     |(redirect)|
   +------+       +-----+     +----------------+     +----------+
```

Figure 12: SIP-Based Service Router

Suppose that we connect a value-added service, such as a Personal Call Filtering service hosted by a user's desktop PC, to a certain telephone number. The INAP IDP message is converted to a SIP INVITE message by the SCG and is then forwarded to the NS, just as in the previous example. However, in this case, the number is registered with a reference to a SIP URL. This makes the Number Server proxy the SIP INVITE message to the registered URL, which is the address of the service.

The service responds as a SIP Redirect Server and the Personal Call Filtering service logic determines the response. The NS sends the response back to the SCG which converts the response to an appropriate INAP message. The response from the service is typically "302 Moved Temporarily" with a telephone number in the Contact field.

If the response is 301 or 302, as the examples above suggest, then a telephone number is carried in the contact field. If the user can be reached via several different addresses, then all of them SHOULD be added to the response by means of multiple contact fields. The SCG then selects an address that is valid for the node or application that issued the number query.

As illustrated by the service examples, the Telia/Nortel system aims to allow the introduction of multi-network services without requiring multi-protocol support. The services hence operate in the same way regardless of in which network the call is made and common IP services can be shared across heterogeneous networks.

```
+-----------+   +-------+ SIP +----+     ......  SIP +-----------+
| Network 1 |---| SCG 1 |-----|    |---:       :-----| Service A |
+-----------+   +-------+     |    |   :       :     +-----------+
                              |    |   :       :
+-----------+   +-------+ SIP |    |   :       : SIP +-----------+
| Network 2 |---| SCG 2 |-----| NS |---:       :-----| Service B |
+-----------+   +-------+     |    |   : Any   :     +-----------+
                              |    |   :  IP   :
+-----------+   +-------+ SIP |    |   : net-  : SIP +-----------+
| Network n |---| SCG n |-----|    |---: work  :-----| Service C |
+-----------+   +-------+     +----+   :       :     +-----------+
                                       :       :
+--------+                SIP          :       : SIP +-----------+
| SIP UA |-----------------------------:       :-----| Service x |
+--------+                             '.......'     +-----------+
```

Figure 13: Interconnecting Heterogeneous Networks via SIP

6.3. Security

The Telia/Nortel architecture uses security mechanisms available to ordinary SIP services, implemented as they would be in a pure SIP network. The architecture described here does not impose any additional security considerations.

General security issues that must be considered include interconnection of two different networks. SCGs must therefore include mechanisms that prevent destructive service control signaling from one network to the other. For example, a firewall-type

mechanism that can block a denial-of- service attack from an Internet user toward the PSTN.

7. Security Considerations

Overall, the SPIRITS security requirements are essentially the same as those for PINT [3, 4], which include, for example:

+ Protection of the PSTN from attacks from the Internet.

+ Peer entity authentication to allow a communicating entity to prove its identity to another in the network.

+ Authorization and access control to verify if a network entity is allowed to use a network resource.

+ Confidentiality to avoid disclosure of information (e.g., the end user profile information and data) without the permission of its owner.

+ Non-repudiation to account for all operations in case of doubt or dispute.

As seen in the previous sections, most implementations examined in this document have employed means (e.g., firewalls and encryption) to meet these requirements. The means are, however, different from implementation to implementation.

8. Conclusion

This document has provided information relevant to the development of inter-networking interfaces between the PSTN and Internet for supporting SPIRITS services. Specifically, it described four existing implementations of SPIRITS-like services. Surveying these implementations, we can make the following observations:

o The ICW service plays the role of a benchmark service. All four implementations can support ICW, with three specifically designed for it.

o SIP is used in most of the implementations as the based communications protocol between the PSTN and Internet. (NEC's implementation is the only exception that uses a proprietary protocol. Nevertheless, NEC has a plan to support SIP together

with the extensions for SPIRITS services.)

o All implementations use IN-based solutions for the PSTN part.

It is clear that not all pre-SPIRITS implementations inter-operate with each other. It is also clear that not all SIP-based implementations inter-operate with each other given that they do not support the same version of SIP. It is a task of the SPIRITS Working Group to define the inter-networking interfaces that will support inter-operation of the future implementations of SPIRITS services.

9. References

[1] Petrack, S. and L. Conroy, "The PINT Service Protocol: Extensions to SIP and SDP for IP Access to Telephone Call Services", RFC 2848, June 2000.

[2] Handley, H., Schulzrinne, H., Schooler, E. and J. Rosenberg, "SIP: Session Initiation Protocol", RFC 2543, March 1999.

[3] Lu, H. (Ed.), Krishnaswamy, M., Conroy, L., Bellovin, S., Burg, F., DeSimone, A., Tewani, F., Davidson, D., Schulzrinne, H. and K. Vishwanathan, "Toward the PSTN/Internet Inter-Networking--Pre-PINT Implementations", RFC 2458, November 1998.

10. Authors' Addresses

Igor Faynberg
Lucent Technologies
Room 4L-334
101 Crawfords Corner Road
Holmdel, NJ, USA 07733-3030

Phone: +1 732 949 0137
EMail: faynberg@lucent.com

Hui-Lan Lu
Lucent Technologies
Room 4L-317
101 Crawfords Corner Road
Holmdel, NJ, USA 07733-3030

Phone: +1 732 949 0321
EMail: huilanlu@lucent.com

John Voelker
Lucent Technologies
Room 1A-417
263 Shuman Blvd PO Box 3050
Naperville, IL, USA 60566-7050

Phone: +1 630 713 5538
EMail: jvoelker@lucent.com

Mark Weissman
Lucent Technologies
Room NE406B
200 Lucent Lane
Cary, NC, USA 27511-6035

Phone: +1 919 463 3258
EMail: maw1@lucent.com

Weizhong Zhang
Lucent Technologies
Room 01-A5-17
2000 Regency Parkway
Cary, NC, USA 27511-8506

Phone: +1 919 380-6638
EMail: wzz@lucent.com

Sung-Yurn Rhim
Korea Telecom
17 Woomyun-dong
Seocho-gu, Seoul, Korea

Phone: +82 2 526 6172
EMail: syrhim@kt.co.kr

Jinkyung Hwang
Korea Telecom
17 Woomyun-dong
Seocho-gu, Seoul, Korea

Phone: +82 2 526 6830
EMail: jkhwang@kt.co.kr

Shinji. Ago
NEC Corporation
1131, Hinode, Abiko,
Chiba, 270-1198, Japan

Phone: +81 471 85 7412
EMail: ago@ssf.abk.nec.co.jp

S. Moeenuddin
NEC America, Inc
1525 Walnut Hill Lane,
Irving, TX, USA 75038

Phone: +1 972 518 5102
EMail: moeen@asl.dl.nec.com

S. Hadvani
NEC America, Inc
1525 Walnut Hill Lane,
Irving, TX, USA 75038

Phone: +1 972 518 3628
EMail: hadvani@asl.dl.nec.com

Soren Nyckelgard
Telia Research
Chalmers Teknikpark
41288 Gothenburg
Sweden

EMail: soren.m.nyckelgard@telia.se

John Yoakum
Nortel Networks
507 Airport Blvd, Suite 115,
Morrisville, NC, USA 27560

EMail: yoakum@nortelnetworks.com

Lewis Robart
Nortel Networks
P.O. Box 402
Ogdensburg, NY, USA 13669

EMail: robart@nortelnetworks.com

11. Full Copyright Statement

Acknowledgement

Funding for the RFC Editor function is currently provided by the Internet Society.

```
File   9:Business & Industry(R) Jul/1994-2005/May 27
         (c) 2005  The Gale Group
File  15:ABI/Inform(R) 1971-2005/May 28
         (c) 2005 ProQuest Info&Learning
File  16:Gale Group PROMT(R) 1990-2005/May 26
         (c) 2005 The Gale Group
File  20:Dialog Global Reporter 1997-2005/May 31
         (c) 2005 The Dialog Corp.
File  47:Gale Group Magazine DB(TM) 1959-2005/May 27
         (c) 2005 The Gale group
File  75:TGG Management Contents(R) 86-2005/May W4
         (c) 2005 The Gale Group
File  80:TGG Aerospace/Def.Mkts(R) 1982-2005/May 27
         (c) 2005 The Gale Group
File  88:Gale Group Business A.R.T.S. 1976-2005/May 26
         (c) 2005 The Gale Group
File  98:General Sci Abs/Full-Text 1984-2004/Dec
         (c) 2005 The HW Wilson Co.
File 112:UBM Industry News 1998-2004/Jan 27
         (c) 2004 United Business Media
File 141:Readers Guide 1983-2005/Dec
         (c) 2005 The HW Wilson Co
File 148:Gale Group Trade & Industry DB 1976-2005/May 27
         (c)2005 The Gale Group
File 160:Gale Group PROMT(R) 1972-1989
         (c) 1999 The Gale Group
File 275:Gale Group Computer DB(TM) 1983-2005/May 27
         (c) 2005 The Gale Group
File 264:DIALOG Defense Newsletters 1989-2005/May 27
         (c) 2005 The Dialog Corp.
File 484:Periodical Abs Plustext 1986-2005/May W4
         (c) 2005 ProQuest
File 553:Wilson Bus. Abs. FullText 1982-2004/Dec
         (c) 2005 The HW Wilson Co
File 570:Gale Group MARS(R) 1984-2005/May 27
         (c) 2005 The Gale Group
File 608:KR/T Bus.News. 1992-2005/May 31
         (c)2005 Knight Ridder/Tribune Bus News
File 620:EIU:Viewswire 2005/May 27
         (c) 2005 Economist Intelligence Unit
File 613:PR Newswire 1999-2005/May 31
         (c) 2005 PR Newswire Association Inc
File 621:Gale Group New Prod.Annou.(R) 1985-2005/May 27
         (c) 2005 The Gale Group
File 623:Business Week 1985-2005/May 26
         (c) 2005 The McGraw-Hill Companies Inc
File 624:McGraw-Hill Publications 1985-2005/May 31
         (c) 2005 McGraw-Hill Co. Inc
File 634:San Jose Mercury  Jun 1985-2005/May 29
         (c) 2005 San Jose Mercury News
File 635:Business Dateline(R) 1985-2005/May 28
         (c) 2005 ProQuest Info&Learning
File 647:CMP  Computer Fulltext 1988-2005/May W3
         (c) 2005 CMP Media, LLC
File 696:DIALOG Telecom. Newsletters 1995-2005/May 27
         (c) 2005 The Dialog Corp.
File 674:Computer News Fulltext 1989-2005/May W3
         (c) 2005 IDG Communications
File 810:Business Wire 1986-1999/Feb 28
         (c) 1999 Business Wire
File 813:PR Newswire 1987-1999/Apr 30
```

File 587:Jane`s Defense&Aerospace 2005/May W4

Set	Items	Description
S1	37	COMPACT()SERVICE()NODE??
S2	25420	CSN
S3	63	INTELLIGENT()NETWORK()SERVICE()NODE?
S4	285728	LUCENT
S5	35	(S1 OR S3)(5N)(PLATFORM? OR ARCHITECTURE?)
S6	36	(S1 OR S3)(S)S4
S7	59	S5 OR S6
S8	24	RD S7 (unique items)

8/3,K/1 (Item 1 from file: 9)
DIALOG(R)File 9:Business & Industry(R)

01711675 Supplier Number: 24448756
Lucent to protect Ameritech's privacy
(Lucent Technologies gets 3-yr, multi-million dollar contract to provide telecommunications network privacy hardware and software to Ameritech)
America's Network, v 102, n 22, p 24
November 15, 1998
DOCUMENT TYPE: Journal; News Brief ISSN: 1075-5292 (United States)
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 116

TEXT:
...and other unwanted calls.

Privacy Manager is the first service Ameritech plans to offer through **Lucent** 's new intelligent network **platform** , called **Compact Service Node** /Intelligent Peripheral (CSN/IP), The **platform** allows Ameritech and other carriers to create and offer a variety of new services. The...

...two companies makes Ameritech the first customer for the new platform, which was designed by **Lucent** 's Bell Labs.
...

8/3,K/2 (Item 2 from file: 9)
DIALOG(R)File 9:Business & Industry(R)

01524119 Supplier Number: 24222417 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Lucent Launches Low-cost IN
(Lucent Technologies is introducing a suite of software applications for wireless carriers)
Wireless Week, p 3
April 06, 1998
DOCUMENT TYPE: Journal ISSN: 1085-0473 (United States)
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 331

(USE FORMAT 7 OR 9 FOR FULLTEXT)

TEXT:
figure omitted

Lucent , based in Murray Hill, N.J., last week made two introductions: a scalable computer-telephony integration **platform** , called a **compact service node** /intelligent peripheral, that allows service providers to offer the new applications; and a suite of...

...other services, said Jennifer Byers, Lucent's IN product management director.

The combination of the **compact service node platform** -deployed with a service control point in a network-and the suite of applications enable
...

8/3,K/3 (Item 1 from file: 16)

DIALOG(R)File 16:Gale Group PROMT(R)

09844424 Supplier Number: 85898692 (USE FORMAT 7 FOR FULLTEXT)
Who's on the Line When Call Waiting Beeps? Now, Verizon's Talking Call Waiting Will Tell You; New Service Available in Maine, New Hampshire, Rhode Island and Vermont.
PR Newswire, pNYTU16523042002
April 23, 2002
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 620

... 69 and Call Trace.
Talking Call Waiting and Verizon's basic Call Waiting services use **Lucent** Technologies' **Compact Service Node** hardware and software. With the new service, the name of the caller is retrieved from a Verizon database by the network switch and sent in text format to the **Lucent** service node for text-to-speech conversion. After the Call Waiting tone, the Talking Call...

8/3,K/4 (Item 2 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

08821076 Supplier Number: 76649372 (USE FORMAT 7 FOR FULLTEXT)
Who's on the Line When Call Waiting Beeps? Now, Verizon's Talking Call Waiting Will Tell You; New Service Available in Western Massachusetts.
PR Newswire, pNA
July 20, 2001
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 562

... 69 and Call Trace.
Talking Call Waiting and Verizon's basic Call Waiting services use **Lucent** Technologies' **Compact Service Node** hardware and software. With the new service, the name of the caller is retrieved from a Verizon database by the network switch and sent in text format to the **Lucent** service node for text-to-speech conversion. The innovative **Lucent** technology then speaks the name to the Talking Call Waiting subscriber after the Call Waiting...

8/3,K/5 (Item 3 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

07816130 Supplier Number: 65270527 (USE FORMAT 7 FOR FULLTEXT)
Talking Call Waiting Debuts in Massachusetts.
PR Newswire, pNA
Sept 18, 2000
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 854

... Call Trace. Talking Call Waiting operates along with Verizon's regular Call Waiting Service using **Lucent** Technologies' **Compact Service Node** hardware and software. With the new service, the name is

retrieved from a Verizon database by the network switch and sent in text format to the **Lucent** service node for text-to-speech conversion. The innovative **Lucent** technology then speaks the name to the called subscribers only, along with the initial Call...

8/3,K/6 (Item 4 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

07197366 Supplier Number: 61182198 (USE FORMAT 7 FOR FULLTEXT)
Lucent Launches Bundled Calling Services for CLECs.(Company Business and Marketing)
Computer Telephony, v8, n3, p22
March, 2000
Language: English Record Type: Fulltext
Document Type: Magazine/Journal; Trade
Word Count: 362

(USE FORMAT 7 FOR FULLTEXT)
TEXT:
Lucen t Technologies (Murray Hill, NJ -- 800-4LUCENT, www. **lucent** .com/software) has unveiled the first bundle in a series of calling services that CLECs can use to keep and gain more revenue from customers. Programmed to run on the **Lucent Compact Service Node** (CSN)/intelligent peripheral, these will be offered for the networks of emerging carriers, either bundled...

8/3,K/7 (Item 5 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

05871464 Supplier Number: 53030600 (USE FORMAT 7 FOR FULLTEXT)
Caller Protection: Ameritech Uses Lucent Technologies Hardware and Software for Privacy Protection Services.(Company Operations)
EDGE, on & about AT&T, pNA
Sept 28, 1998
Language: English Record Type: Fulltext
Document Type: Newsletter; Trade
Word Count: 523

... and other unwanted calls.
Privacy Manager will be the first service Ameritech will offer through **Lucent** 's new intelligent network **platform** , called **Compact Service Node** /Intelligent Peripheral (CSN/IP). The **platform** enables Ameritech and other service providers to create and offer a variety of new services...

...between the two companies makes Ameritech the first customer for the new platform designed by **Lucent** 's Bell Labs.
"Lucent's hardware and software enables Ameritech to quickly and efficiently offer...
...IP platform-installed in the service provider's central offices and administrative centers-consists of:
Compact Service Node (CSN) o recognizes and responds to customer requests for services. **Lucent** 's CSN supports nearly all brands of wireline and wireless call-routing switches in service...

8/3,K/8 (Item 6 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

05867427 Supplier Number: 53022218 (USE FORMAT 7 FOR FULLTEXT)
Ameritech Uses Lucent Technologies Hardware and Software for Privacy Protection Services.
Business Wire, p1202
Sept 23, 1998
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 569

... and other unwanted calls.
Privacy Manager will be the first service Ameritech will offer through **Lucent** 's new intelligent network **platform** , called **Compact Service Node** /Intelligent Peripheral (CSN/IP). The **platform** enables Ameritech and other service providers to create and offer a variety of new services...

...between the two companies makes Ameritech the first customer for the new platform designed by **Lucent** 's Bell Labs.
"Lucent's hardware and software enables Ameritech to quickly and efficiently offer...

8/3,K/9 (Item 7 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

05833745 Supplier Number: 50344599 (USE FORMAT 7 FOR FULLTEXT)
Deals This Week
ISP Business News, v4, n38, pN/A
Sept 28, 1998
Language: English Record Type: Fulltext
Article Type: Article
Document Type: Magazine/Journal; Trade
Word Count: 1011

... Hoffman, 650/857-1501; Biscom, Scott Bonnell, 978/250-1800
Lucent Technologies (NEV) Ameritech (CLEC)
Lucent Technologies [LU] is providing Ameritech Corp. [AIT] with software and hardware support to the company's Privacy Manager with Sales Screener personal call manager under a three-year contract. **Lucent** 's support for the network is the **Compact Service node** /Intelligent Peripheral, which supports a combination of integrated voice, data and messaging and multimedia.
* Announced...

8/3,K/10 (Item 8 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

05548750 Supplier Number: 48409770 (USE FORMAT 7 FOR FULLTEXT)
Excel Adds Aethos to Partner Program.
Business Wire, p04071256
April 7, 1998
Language: English Record Type: Fulltext
Document Type: Newswire; Trade

Word Count: 443

... ONE Architecture by incorporating Excel's open, programmable switches into the foundation of the Aethos **Intelligent Network Service Node** . The service node is a **platform** designed to facilitate the rapid development and deployment of advanced services, with the shortest possible ...

8/3,K/11 (Item 9 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

04278934 Supplier Number: 46269145 (USE FORMAT 7 FOR FULLTEXT)
CELLULAR WIN: HP OPENCALL SELECTED AS ARCHITECTURE **FOR MOTOROLA** INTELLIGENT - NETWORK SERVICE NODE ; **HP OPENCALL COMPONENTS AND SERVERS TO BE USED BY MOTOROLA CELLULAR INFRASTRUCTURE GROUP**
EDGE, on & about AT&T, pN/A
April 1, 1996
Language: English Record Type: Fulltext
Document Type: Newsletter; Trade
Word Count: 291

CELLULAR WIN: HP OPENCALL SELECTED AS ARCHITECTURE **FOR MOTOROLA** INTELLIGENT - NETWORK SERVICE NODE ; **HP OPENCALL COMPONENTS AND SERVERS TO BE USED BY MOTOROLA CELLULAR INFRASTRUCTURE GROUP**

8/3,K/12 (Item 10 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

04022467 Supplier Number: 45846647 (USE FORMAT 7 FOR FULLTEXT)
AIN: ACCESSLINE TECHNOLOGIES & TANDEM COMPUTERS ANNOUNCE AVAILABILITY OF ONE PERSON, ONE NUMBER SERVICES ON TANDEM PLATFORM
EDGE, on & about AT&T, v10, n376, pN/A
Oct 9, 1995
Language: English Record Type: Fulltext
Document Type: Newsletter; Trade
Word Count: 643

... the many benefits of AccessLine's unique technology."
AccessLine's One Person, One Number service **platform** is an advanced **intelligent network service node** that is the most widely deployed system of its kind in the world today. Operating...

8/3,K/13 (Item 11 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

04013398 Supplier Number: 45831443 (USE FORMAT 7 FOR FULLTEXT)
AccessLine Technologies and Tandem Computers announce availability of One Person, One Number services on Tandem platform.
Business Wire, p10020005
Oct 2, 1995
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 719

... the many benefits of AccessLine's unique technology."
AccessLine's One Person, One Number service **platform** is an advanced **intelligent network service node** that is the most widely deployed system of its kind in the world today. Operating...

8/3,K/14 (Item 12 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

03990878 Supplier Number: 45794757 (USE FORMAT 7 FOR FULLTEXT)
JAPAN TELECOM: NIPPON TELEGRAPH & TELEPHONE CORP. (NTT) & ACCESSLINE TECHNOLOGIES TO DELIVER ONE PERSON, ONE NUMBER SERVICE IN JAPAN
EDGE, on & about AT&T, v10, n373, pN/A
Sept 18, 1995
Language: English Record Type: Fulltext
Document Type: Newsletter; Trade
Word Count: 670

... have personal freedom, flexibility, and accessibility on their terms.
THE TECHNOLOGY The One Number Service **platform** is an advanced **intelligent network service node** that is the most widely deployed system of its kind in the world today. Operating...

8/3,K/15 (Item 1 from file: 20)
DIALOG(R)File 20:Dialog Global Reporter

22409923 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Who's on the Line When Call Waiting Beeps?
PR NEWSWIRE
April 23, 2002
JOURNAL CODE: WPRW LANGUAGE: English RECORD TYPE: FULLTEXT
WORD COUNT: 568

(USE FORMAT 7 OR 9 FOR FULLTEXT)

... Call Trace.
Talking Call Waiting and Verizon's basic Call Waiting services use Lucent Technologies' **Compact Service Node** hardware and software. With the new service, the name of the caller is retrieved from a Verizon database by the network switch and sent in text format to the **Lucent** service node for text-to-speech conversion. After the Call Waiting tone, the Talking Call...

8/3,K/16 (Item 2 from file: 20)
DIALOG(R)File 20:Dialog Global Reporter

07504519 (USE FORMAT 7 OR 9 FOR FULLTEXT)
LUCENT TECHNOLOGIES: Cavalier Telephone buys Lucent Internet Call Waiting software
M2 PRESSWIRE
September 29, 1999
JOURNAL CODE: WMPR LANGUAGE: English RECORD TYPE: FULLTEXT
WORD COUNT: 538

(USE FORMAT 7 OR 9 FOR FULLTEXT)

... forwarding telephone calls received while connected to the Internet.
The software, loaded on Lucent's **Compact Service Node** and deployed in a service provider's network, recognizes and responds to customer requests for services. **Lucent** 's Compact SN supports nearly all brands of call-routing switches in service providers' networks...

8/3,K/17 (Item 3 from file: 20)
DIALOG(R)File 20:Dialog Global Reporter

04165611 (USE FORMAT 7 OR 9 FOR FULLTEXT)
LUCENT TECHNOLOGIES: Lucent introduces personal asst technology for broad consumer and business markets
M2 PRESSWIRE
January 28, 1999
JOURNAL CODE: WMPR LANGUAGE: English RECORD TYPE: FULLTEXT
WORD COUNT: 776

(USE FORMAT 7 OR 9 FOR FULLTEXT)

... migrate to the complete Personal Assistant service over time.
Deployed on Lucent's standards-based **Intelligent Network Service Node** or **Compact Service Node** , Personal Assistant will operate on a variety of fixed and mobile communications networks throughout the world. **Lucent** 's proven Intelligent Network platforms provide the reliability and scalebility needed to deploy revenue generating...

... Assistant to expanding markets. Personal Assistant also leverages international language expertise from Bell Labs and **Lucent** Speech Solutions, allowing **Lucent** to offer future versions of the service optimized for common languages in North America, South...

8/3,K/18 (Item 4 from file: 20)
DIALOG(R)File 20:Dialog Global Reporter

04143143 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Lucent Technologies Introduces Personal Assistant Technology for the Broad Consumer and Business Markets
PR NEWSWIRE
January 27, 1999
JOURNAL CODE: WPRW LANGUAGE: English RECORD TYPE: FULLTEXT
WORD COUNT: 802

(USE FORMAT 7 OR 9 FOR FULLTEXT)

... migrate to the complete Personal Assistant service over time.
Deployed on Lucent's standards-based **Intelligent Network Service Node** or **Compact Service Node** , Personal Assistant will operate on a variety of fixed and mobile communications networks throughout the world. **Lucent** 's proven Intelligent Network platforms provide the reliability and scalebility needed to deploy revenue generating...

... Assistant to expanding markets. Personal Assistant also leverages international language expertise from Bell Labs and **Lucent** Speech

Solutions, allowing **Lucent** to offer future versions of the service optimized for common languages in North America, South...

8/3,K/19 (Item 5 from file: 20)
DIALOG(R)File 20:Dialog Global Reporter

02921440 (USE FORMAT 7 OR 9 FOR FULLTEXT)
LUCENT TECHNOLOGIES: Ameritech uses Lucent hardware and software for privacy protection services
M2 PRESSWIRE
September 24, 1998
JOURNAL CODE: WMPR LANGUAGE: English RECORD TYPE: FULLTEXT
WORD COUNT: 568

(USE FORMAT 7 OR 9 FOR FULLTEXT)

... Manager will be the first service Ameritech will offer through Lucent's new intelligent network **platform** , called **Compact Service Node** /Intelligent Peripheral (CSN/IP). The **platform** enables Ameritech and other service providers to create and offer a variety of new services ...

...between the two companies makes Ameritech the first customer for the new platform designed by **Lucent** 's Bell Labs.
"Lucent's hardware and software enables Ameritech to quickly and efficiently offer...
...centers-consists of:
* Compact Service Node (CSN) - recognizes and responds to customer requests for services. **Lucent** 's CSN supports nearly all brands of wireline and wireless call-routing switches in service...

8/3,K/20 (Item 6 from file: 20)
DIALOG(R)File 20:Dialog Global Reporter

01323177 (USE FORMAT 7 OR 9 FOR FULLTEXT)
LUCENT TECHNOLOGIES: Intelligent network software solutions enable rapid deployment of new services
M2 PRESSWIRE
March 31, 1998
JOURNAL CODE: WMPR LANGUAGE: English RECORD TYPE: FULLTEXT
WORD COUNT: 400

... service providers to roll out new revenue-generating services quickly and economically.
Lucent's new **Compact Service Node** /Intelligent Peripheral (SN/IP) solutions provide the capability for service providers to offer their customers...

8/3,K/21 (Item 1 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

08117908 SUPPLIER NUMBER: 17373083 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Nippon Telegraph and Telephone Corp. (NTT) and AccessLine Technologies to deliver One Person, One Number(R) service in Japan.

Business Wire, p9080001
Sep 8, 1995
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 631 LINE COUNT: 00065

... have personal freedom, flexibility, and accessibility on their terms.

The Technology

The One Number Service **platform** is an advanced **intelligent network service node** that is the most widely deployed system of its kind in the world today. Operating...

8/3,K/22 (Item 1 from file: 696)
DIALOG(R)File 696:DIALOG Telecom. Newsletters

00629066
NEW PRIVACY MANAGER SERVICE USES LUCENT'S INTELLIGENT NETWORK
INTELLIGENT NETWORK NEWS
October 14, 1998 VOL: 8 ISSUE: 21 DOCUMENT TYPE: NEWSLETTER
PUBLISHER: PHILLIPS BUSINESS INFORMATION
LANGUAGE: ENGLISH WORD COUNT: 399 RECORD TYPE: FULLTEXT

TEXT:
...to block telemarketing and other unwanted calls.
Ameritech has incorporated Murray Hill, N.J.-based **Lucent** Technologies's [LU] **Compact Service Node** /Intelligent Peripheral (SN/IP) hardware and software in its new Privacy Manager with Sales Screener...

...IN Line

Ameritech is the first customer for the new intelligent network platform designed by **Lucent** 's Bell Labs. **Lucent** introduced the CSN/IP platform in March and Ameritech tested it for three months. The...
...in
Chicago and Detroit for $3.95 a month.
Jack Kozik, architecture planning director for **Lucent** 's IN area, says the intelligent network platform solutions are customer-friendly, making services quick...

...is just another way for carriers to better serve their customers," he says.
"Because the **Compact Service Node** has a standard interface, it was able to plug into the customers' network. The Privacy Manager Service, in the case of the **Compact Service Node** , is sized right for the needs of the service," Kozik continues.
The CSN/IP offers...

...updating
announcements for their individual needs, eliminating the need for expensive manual procedures.
(Gordon Zwirkoski, **Lucent** , 847-290-3382; Dave Onak, Ameritech, 312/750-5639.)
...

8/3,K/23 (Item 1 from file: 810)
DIALOG(R)File 810:Business Wire

0568783 BW0165

Business Wire Recap

March 25, 1996

Byline: EDITORS

...expanded USPS Order (BW1247 11:16)
(HEWLETT-PACKARD-4)(HWP) DALLAS--HP OpenCall Selected as **Architecture** for Motorola **Intelligent - Network Service Node** ; (BW0134 11:17)
(HITACHI/TEACHER-EXCHANGE)(HIT) TARRYTOWN, N.Y.--Japanese teachers visit Westchester schools...

8/3,K/24 (Item 2 from file: 810)
DIALOG(R)File 810:Business Wire

0568738 BW0134

HEWLETT PACKARD 4: HP OpenCall Selected as Architecture **for Motorola** Intelligent - Network Service Node ; **HP OpenCall Components and Servers to be Used by Motorola Cellular Infrastruct**ure Group

March 25, 1996

Byline: Business Editors/Computer Writers

HP OpenCall Selected as Architecture **for Motorola** Intelligent - Network Service Node ; **HP OpenCall Components and Servers to be Used by Motorola Cellular Infrastructure Group**

?

8/7/2 (Item 2 from file: 9)
DIALOG(R)File 9:Business & Industry(R)

01524119 Supplier Number: 24222417 (THIS IS THE FULLTEXT)
Lucent Launches Low-cost IN
(Lucent Technologies is introducing a suite of software applications for wireless carriers)
Wireless Week, p 3
April 06, 1998
WORD COUNT: 331

TEXT:
By Brad Smith

Lucent Technologies Inc. last week unveiled a scalable intelligent network platform with a suite of software applications that will allow a broad range of wireless carriers to offer customized services to their subscribers at a low cost.

"Carriers will be able to get into new IN-based services without investing millions of dollars," said Mona Johnson, executive director of the IN Forum and owner of the consulting firm Technical Marketing Inc. of St. Petersburg, Fla. She predicted Lucent's new platform and applications would be particularly attractive to smaller carriers that want enhanced services.

figure omitted

Lucent , based in Murray Hill, N.J., last week made two introductions: a scalable computer-telephony integration **platform** , called a **compact service node** /intelligent peripheral, that allows service providers to offer the new applications; and a suite of new applications for carriers using either global system for mobile communications or Interim Standard-41 that offers "anytime, anywhere" roaming.

The wireless applications include advanced features such as prepaid use, virtual private networks, voice-activated dialing, flexible alerting, local number portability, enhanced 911, personal number, usage limitation and advanced routing services.

The personal number and usage limitation features are available only to GSM carriers through subscriber identity module cards, while local number portability and E911 are being offered only for IS-41 systems.

Lucent expects the application suite will be one answer for the huge costs wireless carriers face in the next few years to provide local number portability. Portability may not be a revenue-generator, but carriers might recoup some of the cost by being able to provide subscribers the other services, said Jennifer Byers, Lucent's IN product management director.

The combination of the **compact service node platform** -deployed with a service control point in a network-and the suite of applications enable carriers to "pay-as-you-go" with minimal hardware costs and the ability to migrate to larger operations, Byers said.

The compact SN/IP platform allows the combination and integration of voice, data, messaging and multimedia across a network, Lucent's announcement said. Because the platform supports Internet protocols, it bridges voice and data networks.

8/7/15 (Item 1 from file: 20)
DIALOG(R)File 20:Dialog Global Reporter

22409923 (THIS IS THE FULLTEXT)
Who's on the Line When Call Waiting Beeps?
PR NEWSWIRE
April 23, 2002

Consumers in Maine, New Hampshire, Rhode Island and Vermont no longer need to wonder who's calling when they hear the Call Waiting beep on their phone line. With Verizon's new Talking Call Waiting service, they'll also hear the name of the caller.

"Talking Call Waiting is another tool our customers can use to manage their calls, their time and their lives," said Anne Kraus-Keenan, Verizon's group manager of new product development. "Like Caller ID, Talking Call Waiting takes the mystery out of who's calling."

The service is already available to Verizon customers in the New York City area, Massachusetts and New Jersey. Verizon plans to offer the service to several additional markets in the coming months.

"With Talking Call Waiting, customers can decide who they'll talk to and when, letting them decide between business calls and social calls, urgent calls or leisure calls, customer calls or supplier calls," Kraus-Keenan said.

The monthly charge for Talking Call Waiting varies by state, ranging from $5.75 to $7.50. The cost includes basic Call Waiting service. Customers can get the service for as low as $2 a month when purchased with several service packages. The service does not require any additional equipment.

Verizon's advanced network provides Talking Call Waiting by using information about the originating number that is needed to set up calls. That information also is used by the network to enable other features like Caller ID, *69 and Call Trace.

Talking Call Waiting and Verizon's basic Call Waiting services use Lucent Technologies' **Compact Service Node** hardware and software. With the new service, the name of the caller is retrieved from a Verizon database by the network switch and sent in text format to the **Lucent** service node for text-to-speech conversion. After the Call Waiting tone, the Talking Call Waiting subscriber hears the name of the caller. Subscribers can decide whether to interrupt their current call to take the incoming call.

According to Kraus-Keenan, the new service also will be valuable to customers who are visually impaired or physically disabled. These consumers are not able to use Caller ID because they cannot see or get to the display box to read the incoming caller's number.

To sample the Talking Call Waiting message, visit Verizon's online News Center, http://www.verizon.com/news, open this news release and click on the sample sound files.

Verizon Communications is one of the world's leading providers of communications services. Verizon companies are the largest providers of wireline and wireless communications in the United States, with 133.8 million access line equivalents and approximately 29.6 million wireless customers. Verizon is also the largest directory publisher in the world. With more than $67 billion in annual revenues and nearly 248,000 employees, Verizon's global presence extends to more than 40 countries in the Americas, Europe, Asia and the Pacific. For more information on Verizon, visit http://www.verizon.com .

VERIZON'S ONLINE NEWS CENTER: Verizon news releases, executive speeches and biographies, media contacts and other information are available at Verizon's News Center on the World Wide Web at http://www.verizon.com/news. To receive news releases by e-mail, visit the

News Center and register for customized automatic delivery of Verizon news releases.

MAKE YOUR OPINION COUNT - Click Here http://tbutton.prnewswire.com/prn/11690X63871103 Verizon Communications

Contact: Lacy Yeatts, +1-804-779-4097, lacy.yeatts@verizon.com, Peter Reilly, Maine, +1-207-797-1335, peter.j.reilly@verizon.com, Bob Noble, New Hampshire, +1-617-743-3433, robert.c.noble@verizon.com, Tracey Kennedy, Rhode Island, +1-401-525-3631, tracey.a.kennedy@verizon.com, or Beth Fastiggi, Vermont, +1-802-863-0797, m.b.fastiggi@verizon.com, all of Verizon

Website: http://www.verizon.com/

Company News On-Call: http://www.prnewswire.com/comp/094251.html

?

8/7/17 (Item 3 from file: 20)
DIALOG(R)File 20:Dialog Global Reporter

04165611 (THIS IS THE FULLTEXT)
LUCENT TECHNOLOGIES: Lucent introduces personal asst technology for broad consumer and business markets
M2 PRESSWIRE
January 28, 1999

WASHINGTON, D.C. -- Lucent Technologies today introduced the first mass market personal productivity software tool which uses spoken commands to control and screen incoming phone calls, simplify outbound calls and manage voice mail. The Lucent Personal Assistant delivers easier to use, lower-cost virtual assistant technology than was previously available, and is designed for both consumer and business markets. Personal Assistant is available for telephone and mobile service providers, who install the software in their networks and then offer service subscriptions to their customers. The announcement was made here today at ComNet '99, an annual exhibition for the networking and telecommunications industries.

Personal Assistant combines Lucent's cost-effective Intelligent Network platform and unique Bell Labs speech processing technology to create a simplified, lower-cost service than previous personal/virtual assistant offerings. Unlike complex assistant services that bill by the minute and appeal only to limited niche markets, Lucent's intuitive Personal Assistant is designed to be offered for a low monthly subscription to the sizable home and business telephone markets, as well as the growing legion of mobile users.

Lucent created a user-friendly personal assistant service by avoiding needless complexity, concentrating instead on the basic functions of an assistant:

Screen calls-Personal Assistant answers incoming calls, identifies who is calling, then lets users respond by voice to answer a given call or to instruct the assistant to send the call to voice mail. Place calls-Personal Assistant allows subscribers to dial calls by simply speaking a name or phone number.

Take messages-Personal Assistant streamlines voice mail playback by grouping messages by caller's names (e.g., "You have two messages from John Smith and one message from Mary Jones"), then allowing the subscriber to quickly select by voice which messages he or she wants to hear (e.g., "Play the message from Mary Jones").

Find the subscriber as needed-Personal Assistant uses call forwarding or sequential ringing (ringing phones in different locations in a particular order) to locate subscribers and notify them of an incoming call, even if they are already on a different call.

"Personal Assistant leverages critical technologies developed across several Lucent businesses, including Intelligent Networking software, speech recognition from Bell Labs and voice messaging from the Octel unit," said Lance Boxer, group president, communications software, Lucent Technologies. "The combined technologies are specifically designed with broad home and office usability and affordability, which is also attractive for communications providers seeking new, revenue-enhancing service offerings for their subscribers."

Personal Assistant also addresses the call management needs of business users, who struggle to keep up with the crush of calls and voice mail. Additionally, Personal Assistant's simplicity is intended to appeal to the average home user, who has become more protective of personal privacy and is seeking to control interruptions to personal time. Personal Assistant is also a vast improvement for mobile users, who often find themselves working from their cars, where constantly entering keypad commands can be difficult. Personal Assistant's spoken, hands-free

interface is a more-efficient method for mobile communications.

To further promote the mass market acceptance of the virtual assistant concept, Lucent will make selected features of Personal Assistant, such as Voice Dialing and Call Screening, available as stand-alone, Intelligent Network-based services. This building block approach allows service providers to offer targeted services that reflect the specific needs of a variety of markets. The end result is a unique suite of assistant services that build on users' existing experience, allowing subscribers to easily migrate to the complete Personal Assistant service over time.

Deployed on Lucent's standards-based **Intelligent Network Service Node** or **Compact Service Node** , Personal Assistant will operate on a variety of fixed and mobile communications networks throughout the world. **Lucent** 's proven Intelligent Network platforms provide the reliability and scalebility needed to deploy revenue generating services such as Personal Assistant to expanding markets. Personal Assistant also leverages international language expertise from Bell Labs and **Lucent** Speech Solutions, allowing **Lucent** to offer future versions of the service optimized for common languages in North America, South America and Europe.

A market trial version of Personal Assistant is currently available on a limited basis to North American service providers.

ABOUT LUCENT TECHNOLOGIES Lucent Technologies, headquartered in Murray Hill, N.J., designs, builds and delivers a wide range of public and private networks, communications systems and software, data networking systems, business telephone systems and microelectronic components. Bell Labs is the research and development arm for the company. More information about Lucent Technologies is available on the company's Web site at: http://www.lucent.com.

CONTACT: Rich Teplitsky, Lucent Technologies Tel: +1 908 582 5700 e-mail: rteplitsky@lucent.com Dan Coulter, Lucent Technologies Tel: +1 908 580 4111 e-mail: dlcoulter@lucent.com

?

8/7/20 (Item 6 from file: 20)
DIALOG(R)File 20:Dialog Global Reporter

01323177 (THIS IS THE FULLTEXT)
LUCENT TECHNOLOGIES: Intelligent network software solutions enable rapid deployment of new services
M2 PRESSWIRE
March 31, 1998

Lucent Technologies today introduced intelligent network software solutions, including a scalable computer-telephony integration (CTI) platform, that enables network service providers to roll out new revenue-generating services quickly and economically.

Lucent's new **Compact Service Node** /Intelligent Peripheral (SN/IP) solutions provide the capability for service providers to offer their customers advanced features such as interactive voice response, customized announcements, voice-activated dialing and advanced Internet services such as Internet call waiting, as well as the ability to brand services with customized announcements. Business customers can access and update a set of announcements tailored to their individual needs, automatically and without using expensive manual procedures.

"Designed by Bell Labs, these solutions offer network service providers a cost effective way to invent and develop distinctive, high-demand new service offerings, and bring them to market more quickly than they could in the past," said Curtis Holmes, intelligent-network vice president for Lucent's Communications Software Group. "This is the right solution to help providers stay ahead of issues such as technological change, deregulation and the increasing mobility of customers. It's IN with a real competitive edge."

The Compact SN/IP is a multiple application platform on which the full spectrum of voice, data, messaging and multimedia can be readily combined and integrated across a network. This gives service providers the ability to react quickly to grow revenue streams in specific services while maintaining a consistent approach to providing advanced, interactive services.

The Compact SN/IP combines the reliability of the telephone network with the flexibility of the Internet. Because the Compact SN/IP supports Internet protocols, it is well positioned as a bridge between voice and data networks. Information from the Internet can be retrieved and delivered to anyone on the telephone. Conversely, voice calls and data from the switched telephone network can be delivered to emerging data networks.

Intelligent Peripheral software is a key component in deploying efficient, integrated service solutions which are quickly replacing the non-integrated "point solutions" of the past. Integrated solutions can eliminate long set-up times, which could cause service providers problems.

Lucent Technologies, headquartered in Murray Hill, N.J., designs, builds and delivers a wide range of public and private networks, communications systems and software, data networking systems, business telephone systems and microelectronic components.

Bell Labs is the research and development arm for the company. For more information on Lucent Technologies, visit the company's web site at http://www.lucent.com.

CONTACT: Dan Coulter, Lucent Technologies Tel: +1 908 580 4111 e-mail: dlcoulter@lucent.com Donna Cunningham, Lucent Technologies Tel: +1 802 482 3748 e-mail: donnac@lucent.com

?

8/9/22 (Item 1 from file: 696)
DIALOG(R)File 696:DIALOG Telecom. Newsletters

00629066

NEW PRIVACY MANAGER SERVICE USES LUCENT'S INTELLIGENT NETWORK

INTELLIGENT NETWORK NEWS
October 14, 1998 VOL: 8 ISSUE: 21 DOCUMENT TYPE: NEWSLETTER
PUBLISHER: PHILLIPS BUSINESS INFORMATION
LANGUAGE: ENGLISH WORD COUNT: 399 RECORD TYPE: FULLTEXT

TEXT:
Chicago-based Ameritech [AIT] has introduced a new privacy service which will offer residential customers the choice and control to block telemarketing and other unwanted calls.
Ameritech has incorporated Murray Hill, N.J.-based **Lucent** Technologies's [LU] **Compact Service Node** /Intelligent Peripheral (SN/IP) hardware and software in its new Privacy Manager with Sales Screener Service.
Privacy Manager intercepts all incoming calls that register as "private," "blocked," "out of area," "unavailable," or "unknown" on Caller ID displays.
The caller is then asked to record his/her name before the call is connected. The subscriber is told who is calling and then has the choice of accepting the call, rejecting the call or playing a recorded message stating the subscriber does not accept telemarketing calls.
The caller is disconnected if he/she does not offer their name.
Ameritech found in testing Privacy Manager that approximately seven out of every ten unidentified callers hung up when intercepted by the service.

First IN Line

Ameritech is the first customer for the new intelligent network platform designed by **Lucent** 's Bell Labs. **Lucent** introduced the CSN/IP platform in March and Ameritech tested it for three months. The companies agreed to a three-year multimillion dollar contract, but neither would not reveal the actual amount. Ameritech's service works in conjunction with Caller ID with Name and is being introduced in Chicago and Detroit for $3.95 a month.
Jack Kozik, architecture planning director for **Lucent** 's IN area, says the intelligent network platform solutions are customer-friendly, making services quick and economical.
"Our customers are keeping an eye towards Internet Protocol as a source of revenue and an improved way of providing services for their customers. The Internet is just another way for carriers to better serve their customers," he says.
"Because the **Compact Service Node** has a standard interface, it was able to plug into the customers' network. The Privacy Manager Service, in the case of the **Compact Service Node** , is sized right for the needs of the service," Kozik continues.
The CSN/IP offers advanced voice, data, messaging and multimedia features so service providers can integrate wireless, wireline or Internet service provider networks and deliver services such as speech recognition, text-to-speech, fax services and recorded announcements.
The customer has the capability of accessing and updating announcements for their individual needs, eliminating the need for expensive manual procedures.
(Gordon Zwirkoski, **Lucent** , 847-290-3382; Dave Onak, Ameritech,

312/750-5639.)

COMPANY NAME(S): Ameritech ; Bell Labs ; First IN Line ; IN ; Lucent